DOCUMENT RESUME

ED 135 971 CE 009 792

TITLE Occupational Outlook for College Graduates, 1976-77 Edition.
INSTITUTION Bureau of Labor Statistics (DOL), Washington, D.C.
PUB DATE 77
NOTE 271p.
AVAILABLE FROM Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402 (Stock Number 029-001-01407-4, Catalog No. L2.3:1878, $3.30)

EDRS PRICE MF-$0.83 HC-$14.05 Plus Postage.
DESCRIPTORS *Career Opportunities; *College Graduates; *Employment Projections; *Employment Qualifications; Employment Trends; *Occupational Information
IDENTIFIERS United States

ABSTRACT

This handbook is a guide to career opportunities in a broad range of occupations for which a college degree is, or is becoming, the usual background for employment. It contains a brief summary of expected changes in the economy, in addition to an analysis of the overall supply and demand situation for college graduates through the mid-1980's. Each of the 26 occupational statements presents information on the nature of the work, places of employment, education and training required, employment outlook, earnings, and working conditions. The 26 occupations are grouped under 10 headings: Office occupations, service occupations, education and related occupations, sales occupations, occupations in transportation activities, scientific and technical occupations, health occupations, social scientists, social service occupations, and occupations related to art, design, and communications. This volume is intended to be an aid to career planning for students attending or expecting to attend college, as well as their counselors, teachers, and parents. (WL)

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Occupational Outlook for College Graduates, 1976-77 Edition

U.S. Department of Labor
W. J. Usery, Jr., Secretary
Bureau of Labor Statistics
Julius Shiskin, Commissioner
1977

Bulletin 1878

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Preface

Career planning is becoming increasingly essential to college graduates who seek a rewarding career. Changing economic conditions, the emergence of new occupations, and an expected oversupply of graduates in some fields will affect the number and kinds of job opportunities that will be available.

The *Occupational Outlook for College Graduates* is a guide to career opportunities in a broad range of occupations for which a college degree is, or is becoming, the usual background for employment. It contains a brief summary of the expected changes in the economy, in addition to an analysis of the overall supply and demand situation for college graduates through the mid-1980's. Each occupational statement presents information on the nature of the work, places of employment, education and training required, employment outlook, earnings, and working conditions. This volume can be an important aid to career planning for students attending or expecting to attend college, as well as their counselors, teachers, and parents.

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I. HOW THIS BOOK IS ORGANIZED

This chapter describes the contents and organizations of *the Occupational Outlook for College Graduates.* The first section tells how the information was assembled and discusses a number of points that need to be kept in mind while interpreting the occupational statements that make up the main body of the book. The second section of this chapter gives suggestions regarding supplementary sources of occupational information and tells how you can keep up to date on developments affecting the employment outlook in different occupations. The third section provides information on the sources and methods used to analyze the occupational outlook in different fields of work.

The second introductory chapter describes some of the most important occupational and industrial employment trends—and their relationship to college graduates—to provide a background for interpreting the reports on individual occupations.

OCCUPATIONAL OUTLOOK STATEMENTS

The occupational statements that follow the two introductory chapters are reprinted from the 1976-77 edition of the Occupational Outlook Handbook. These reports are grouped into 10 "clusters" of occupations: Office occupations; service occupations; education and related occupations; sales occupations; occupations in transportation activities; scientific and technical occupations; health occupations; social science occupations; social service occupations; and art, design, and communications related occupations. These career clusters help relate outlook materials to college curriculums and occupational training programs, career ladders and lattices, and fields of interest for college or potential college students engaged in career exploration and planning. The clusters are based on a concept of related activities. Physicians, for example, are in the same cluster as hospital administrators and all other health employees. Within some of these career clusters, occupations are further grouped into related subfields. For example, within the office occupation cluster, there are groups for administrative and related occupations, computer and related occupations, and insurance occupations.

The occupations discussed in this volume generally are those of greatest interest to college students and graduates, and include those for which a college education is required, is becoming increasingly necessary, or is the usual educational background for employment. Occupations covered include workers in professional and related occupations, sales occupations, managerial and administrative occupations, and service occupations. The statements in this publication account for about 90 percent of all workers in professional and related occupations, and for smaller proportions of workers in other major groups. More than three-fifths of all college graduates work in professional and related occupations; smaller proportions are in other major occupational groups.

Points to Bear in Mind in Using Occupational Statements

A detailed list of the occupational reports by field of work is provided in the table of contents at the front of the book.

Once you have chosen an occupation you'd like to learn more about—you can use the *Occupational Outlook for College Graduates* to find out what the job is like, what education and training is necessary, and what the advancement possibilities, earnings, and employment outlook are likely to be. Each section of the book follows a standard format, making it easier to compare different jobs with one another.

It is important to bear in mind that the information in the *Occupational Outlook for College Graduates* is designed for career guidance purposes. In the effort to present a meaningful overview of each of the many occupations studied, details are omitted, and some distinctions are glossed over. Moreover, each statement has its own limitations, mostly because of imperfect data sources and limits on length. What follows is a description of the type of information presented in each statement, with a few words of explanation.

The numbers in parentheses which appear just below the title of most statements are D.O.T. code numbers. D.O.T. stands for *Dictionary of Occupational Titles,* now in its third edition, a U.S. Department of Labor publication which "defines" each of about 35,000 jobs according to a system which uses code numbers to classify each job in terms of the type of work performed, training required, physical demands, and working conditions. Revision of the D.O.T. is underway, and the fourth edition is scheduled to appear in 1976. It will include thousands of new jobs which have emerged as a result of technological and other changes in the past 10 years. D.O.T. numbers are used primarily by public employment service agencies for classifying applicants and job openings, and for reporting and other operating purposes. They are included in the *Occupational Outlook for College Graduates* since career information centers and libraries frequently use them for filing occupational information.

The *Nature of the Work* section describes the major duties of workers in the occupation. It tells what workers do on the job and how they do it. Although each job description is typical of the occupation, duties are likely to vary by employer and size of employing organization, geographic location, and other factors. In some occupations, individual workers specialize in certain tasks. In others they perform the entire range of work in the occupation. Of course, job duties continually change as technology advances, new industrial processes are developed, and products or services change. In preparing the *Occupational Outlook for College Graduates* every effort is made to include the most recent information available, but because of the rapid rate of change in some fields, this is not always possible.

The *Places of Employment* section provides information on the number of workers in an occupation and tells whether they are concentrated in certain industries or geographic areas. Whether an occupation is large or small is important to a jobseeker because large occupations, even those growing slowly, offer more openings than small ones because of the many workers who retire or die each year.

Some occupations are concentrated in particular industries. Most aerospace engineers, for example, are employed in the aircraft and parts industry while accountants are widely dispersed throughout all industries. If an occupation is found primarily in certain industries, this section lists them.

A few occupations are concentrated in certain parts of the country. Actors and actresses, for example, usually work in California and New York. This information is included for the benefit of people who have strong preferences about where they live—because they do not wish to be separated from their families and friends, for example. For most occupations, however, employment is widely scattered and generally follows the same pattern as the distribution of the population.

In addition, the proportion of women employed is mentioned in a number of statements. Information on part-time employment is included because it is important to students, homemakers, retired persons, and others who may want to work part time. Knowing which occupations offer good opportunities for part-time work can be a valuable lead.

The *Training, Other Qualifications, and Advancement* section should be read carefully because it often is necessary to start early in planning toward your career goal. It's a good idea to look closely at the college courses or major fields of study that are regarded as useful preparation for the career you have in mind. Nearly all statements provide this information.

The Training, Other Qualifications, and Advancement section generally presents the minimum level and type of education required for the various occupations and the preferred background for entry. In many cases, alternative ways of attaining training are listed as well. It is worth remembering that the level at which you enter an occupation and the speed with which you advance often are determined by the amount of training you have.

In an effort to protect the public, all States have certification or licensing requirements for some occupations to assure that workers are properly qualified. Physicians and nurses, and elementary and secondary schoolteachers are examples of occupations that are licensed. If you are considering occupations that require State licensing, be sure to check the requirements in the State which you plan to work.

An important factor in career choice is the extent to which a particular job suits your personality. Although it is often difficult for people to assess themselves, your counselor undoubtedly is familar with tests that can help. Each statement provides information which allows you to match your own unique personal characteristics—your likes and dislikes—with the characteristics of the job. For a particular job, you may need the ability to:

make responsible decisions.
motivate others.
direct and supervise others.
work under close supervision.
work in a highly competitive atmosphere.
enjoy working with ideas and solving problems.
enjoy working with people.
enjoy working with things—good coordination and manual dexterity are necessary.
work independently—initiative and self-discipline are necessary.
work as part of a team.
enjoy working with detail, either

numbers or technical written material.
enjoy helping people.
use creative talents and ideas and enjoy having an opportunity for self-expression.
derive satisfaction from seeing the physical results of your work.
work in a confined area.
perform repetitious work.
enjoy working outside, regardless of the weather.

When you decide on an occupation, the "continuing education" that will be required in order to reach the desired level in the occupation is as important a consideration as the initial education requirements. If for example, you see yourself as a college president and begin working as an assistant to the registrar after receiving your bachelor's degree, you should be prepared to spend several years in graduate school. Once the requirements necessary to advance to the desired level of the chosen occupation are determined, you should decide whether you have the natural talents and personal qualities needed, and whether you are willing to put in the time and effort to meet those requirements. If a formal education is involved, will your employer pay for it, and if not, can you afford the cost? Also, you must decide whether you have the academic ability to complete the education.

The *Employment Outlook* section discusses prospective job opportunities. Knowing whether or not the job market is likely to be favorable is quite important in deciding whether to pursue a specific career. While your interests, your abilities, and your career goals are extremely important, you also need to know something about the availability of jobs in the fields that interest you most.

The employment outlook section of most statements in the *Occupational Outlook for College Graduates* begins with a sentence about anticipated employment growth through 1985. The occupation is described as likely to grow about as fast as the average for all occupations; faster than the average; or slower than the average (figure I). *Job opportunities in a particular occupation usually are favorable if employment increases at least as rapidly as the economy as a whole. Occupations in which employment stays about the same or declines generally offer less favorable job prospects than growing occupations, because the only openings are those due to turnover.*

Some statements take note of the effect of fluctuations in the business cycle. This information is valuable to people looking into long-range career possibilities at a time when the economy is in a recession. Young people understandably wonder: What will the economy be like when I enter the labor market? Will it be harder to find a job 5 to 10 years from now than it is today? The *Occupational Outlook for College Graduates* gives information, wherever feasible, on occupations and industries whose levels of employment fluctuate in response to shifts in the economic climate. It helps to bear in mind that employment in many—but not all—occupations and industries is directly affected by an economic downturn. A sharp improvement in the outlook for these occupations and industries is likely as the economy picks up. However, other occupations and industries are less vulnerable to changes in the business cycle. Other factors influence their well-being. These matters are explored in a number of statements.

For some occupations, it is possible to observe trends in the number of people pursuing relevant types of education or training and subsequently entering the profession. When supply as well as demand information is available, the *Occupational Outlook for College Graduates* describes prospective job opportunities in terms of the anticipated demand-supply relationship. the prospective job situation is termed "excellent" when demand is likely to greatly exceed supply; "keenly competitive" when supply is likely to exceed demand. Other terms used are shown in figure II.

Figure I

Description	*Projected 1974–85 change in employment requirements*
Much faster than the average for all occupations	50.0 percent or greater
Faster than the average for all occupations	25.0 to 49.9 percent
About as fast as the average for all occupations [1]	15.0 to 24.9 percent
Slower than the average for all occupations	4.0 to 14.9 percent
Little change is expected	3.9 to −3.9 percent
Expected to decline	−4.0 percent or greater

[1] The average increase projected for all occupations for the 1974–85 period is 20.3 percent.

Figure II

Job opportunities	*Prospective demand-supply relationship*
Excellent	Demand much greater than supply
Very good	Demand greater than supply
Good or favorable	Rough balance between demand and supply
May face competition	Likelihood of more supply than demand
Keen competition	Supply greater than demand

The information in this section should be used carefully, however. The prospect of relatively few openings, or of strong competition, in a field that interests you should make you take a second look at your career choice. But this information alone should not prevent you from pursuing a particular career if you feel that your aptitudes and interests justify your goal. Getting a job may be difficult if the field is so small that openings are few (actuaries and range managers are examples) or so popular that it attracts many more jobseekers than there are jobs (radio and television broadcasting, journalism, and the performing arts). Getting a job also can be difficult in occupations and industries in which employment is declining (merchant marine), although this is not always the case.

Remember, even occupations which are small or overcrowded provide some jobs. So do occupations in which employment is growing very slowly or even declining, for there always is a need to replace workers who leave the occupation. If the occupation is large, the number of job openings due to turnover can be quite substantial. Accountants and real estate salesworkers and brokers are examples of large occupations which provide a significant number of job openings each year because of turnover. On the average, openings resulting from replacement needs account for 70 percent of all job openings.

In other words, *don't* rule out a potentially rewarding career simply because the prospective outlook in an occupation is not favorable. *Do* discuss your abilities and aptitudes with your counselor. Checking further is a good idea, too. Suggestions for additional information on the job market are given in the following section, Where to go For More Information.

How reliable is the information on the outlook for employment over the next 10 years? No one can predict future labor market conditions with perfect accuracy. In every occupation and industry the number of jobseekers and the number of job openings constantly changes. A rise or fall in the demand for a product or service affects the number of workers needed to produce it. New inventions and technological innovations create some jobs and eliminate others. Changes in the size or age distribution of the population, work attitudes, training opportunities, or retirement programs determine the number of workers available. As these forces interact in the labor market, some occupations experience a shortage, some a surplus, some a balance between jobseekers and openings. Methods used by economists to develop information on future occupational prospects differ, and judgments which go into any assessment of the future also differ. Therefore, it is important to understand what underlies each statment on outlook.

For every occupation and industry covered in the *Occupational Outlook for College Graduates*, an estimate of future employment needs is developed. These estimates are consistent with a set of assumptions about the future of the economy and the country. For more detail, see the section entitled, Assumptions and Methods Used In Preparing the Employment Projections.

Finally, you should remember that job prospects in your community or State may not correspond to the description of employment outlook in the *Occupational Outlook for College Graduates*. For the particular job you are interested in, the outlook in your area may be better, or worse. This publication does not discuss the outlook in local areas because the analysis is far too much for a centralized staff to handle. Such information has been developed, however, by many States and localities. The local office of your State Employment Service is the best place to ask about local-area employment projections. Be sure to check with your parents and counselors, too.

The *Earnings* section helps answer many of the questions that you may ask when choosing a career. Will the income be high enough to maintain the standard of living I want and justify my training costs? How much will my earnings increase as I gain experience? Do some areas of the country or some industries offer better pay than others for the same type of work?

Like most people, you probably think of earnings as money. But money is only one type of financial reward for work. Paid vacations, health insurance, uniforms, and discounts on clothing or other merchandise also are part of the total earnings package.

About 9 out of 10 workers receive money income in the form of a *wage or salary*. A wage usually is an hourly or daily rate of pay, while a salary is a weekly, monthly, or yearly rate. Most craft workers, operatives, and laborers are wage earners, while most professional, technical, and clerical workers are salary earners.

In addition to their regular pay, wage and salary workers may receive extra money for working overtime, more than their usual number of hours, or on a night shift or irregular schedule. In some occupations, workers also may receive tips or be paid a commission based on the amount of sales or services they provide to customers. Factory workers are sometimes paid a piece rate which is an extra payment for each item they produce. For many workers, these types of pay amount to a large part of their total earnings.

The remaining 10 percent of all workers are in business for themselves and earn self-employment income instead of wages or salaries. This group includes workers in a wide variety of occupations: Physicians, shopkeepers, barbers, writers, photographers, and farmers, are examples of workers who frequently are self-employed.

Workers in some occupations earn *self-employment income* in addition to their wages or salaries. For example, electricians and carpenters often do small repair or remodeling jobs during evenings or weekends, and college professors frequently are paid for publishing articles based on independent research.

Besides money income, most wage and salary workers receive a variety of *fringe benefits* as part of their earnings on the job. Several are required by Federal and State law, including Social Security, Worker's Compensation, and Unemployment Insurance. These benefits provide income to persons who are not working because of old age, work-related injury or disability, or lack of suitable jobs.

Among the most common fringe benefits are paid vacations, holidays, and sick leave. In addition, many workers are covered by life, health, and accident insurance; participate in retirement plans; and are entitled to supplemental unemployment benefits. All of these benefits are provided—in part or in full—through their employers. Some employers also offer stock options and profit-sharing plans, savings plans, and bonuses.

Workers in many occupations receive part of their earnings in the form of goods and services, or *payments in kind*. Salesworkers in department stores, for example, often receive discounts on merchandise. Workers in other jobs may receive free meals, housing, business expense accounts, or free transportation on company-owned planes.

Which jobs pay the most? This is a difficult question to answer because good information is available for only one type of earnings—wages and salaries—and for some occupations even this is unavailable. Nevertheless, the *Occupational Outlook for College Graduates* does include some comparisons of earnings among occupations. Most statements indicate whether earnings in an occupation are greater than or less than the average earnings of workers who are not supervisors and work in private industry, but not in farming. This group represented more than 80 percent of all workers in 1974 and had the most reliable earnings data currently available for comparison purposes.

Besides differences among occupations, many levels of pay exist within each occupation. Beginning workers almost always earn less than those who have been on the job for some time because pay rates increase as workers gain experience or do more responsible work.

Earnings in an occupation also vary by geographic location. The average weekly earnings of beginning computer programmers, for example, vary considerably from city to city. (See table 1.) The highest earnings of the 10 cities listed, occurred in Detroit, Michigan and the lowest in Little Rock, Ark. Although it is generally true that earnings are higher in the North Central and Northeast regions than in the West and South, there are exceptions. You should also remember that those cities which offer the highest earnings are often those in which it is most expensive to live.

In addition, workers in the same occupation may have different earnings depending on the industry in which they work. For example, senior drafters in 1973–74 averaged $250 a week in public utilities, $245.50 a week in manufacturing, $238 a week in services, and $218 a week in wholesale trade.

Salaries also vary by the type of work a person performs. The salaries of Ph.D. chemists, for example, vary considerably depending on the specific nature of the job, as shown in table 2. In 1974, chemists in management jobs earned $4,000 a year more than those in marketing and production. Chemists in research and development, however,

Table 1. Average weekly earnings of beginning computer programmers, 1973–74, by selected city

City	Average weekly earnings
Detroit	$212.00
Atlanta	202.50
Cleveland	198.00
Newark	190.00
Seattle	184.00
Washington, D.C	179.00
Omaha	169.50
Milwaukee	164.50
Chattanooga	147.00
Little Rock	129.50

SOURCE: Bureau of Labor Statistics.

Table 2. Average annual salaries of chemists, with Ph.D. degrees, by type of work, 1974

Type of work	Annual salaries
Management	$27,000
Marketing and production	23,000
Research and development	21,500
Teaching	16,800
Other	20,300

SOURCE: American Chemical Society.

earned $1,500 less than those in marketing and production, but $4,700 more than chemistry professors.

Because of these variations in earnings, you should check with your counselor or with local employers if you are interested in specific earnings information for occupations in your area.

The Working Conditions section provides information that can affect job satisfaction because preferences for working conditions vary considerably among individuals. Some people, for example, prefer outdoor work while others prefer working in an office. Some people like the variety of shift work, and others want the steadiness of a 9-to-5 job. Following is a list of several different types of working conditions that apply to some of the occupations in the *Occupational Outlook for College Graduates.*

Overtime work. When overtime is required on a job, employees must give up some of their free time and need to be flexible in their personal lives. Overtime, however, does provide the opportunity to increase earning power.

Shift work. Evening or night work is part of the regular work schedule in some jobs. Employees who work on these shifts usually are working while most other people are off. Some persons prefer shift work, however, because they can pursue certain daytime activities, such as hunting, fishing, or gardening.

Environment. Work settings vary from clean, air-conditioned offices to places that are dirty, greasy, or poorly ventilated. By knowing the setting of jobs you find interesting, you can avoid an environment that you may find particularly unpleasant.

Outdoor work. Persons who work outdoors are exposed to all types of weather. This may be preferred to indoor work, however, by those who consider outdoor work more healthful.

Hazards. In some jobs employees are subject to possible burns, cuts, falls, and other injuries and must be careful to follow safety precautions.

Physical demands. Some jobs require standing, stooping, or heavy lifting. You should be sure that you have the physical strength and stamina required before seeking one of these jobs.

Considering working conditions when you make up your mind about a career can help you choose a job that brings you satisfaction and enjoyment.

Where to Go for More Information

By now, you may have some ideas about jobs that interest you and that seem to suit you. If so, you probably have located appropriate occupational outlook statements and given some thought to the information they contain—either on your own or with the help of your counselor. If you want more information on the job itself, on places in your own locality to look for this kind of work, or on schools which offer appropriate training—or, if instead, you simply want to explore the file a little more—you're ready to go beyond the *Occupational Outlook for College Graduates.*

A great deal of career information is available in the form of books, pamphlets and brochures, magazine articles, filmstrips, tapes, and cassettes. Computer-assisted occupational information systems have been installed in some schools and career information centers.

Most occupational reports in this publication suggest organizations you can write to for additional career information. This is a good way to begin. Then investigate other sources of information, many of which you'll find close to home: schools, libraries, business establishments, trade unions, employer associations, professional societies, private employment agencies, and State Employment Services.

College libraries and placement offices usually have extensive collections of career information. In addition, college career planning and placement counselors generally know of any special information assembled on job opportunities in your locality. Professors of special subjects such as art, drama, or music often can give information about occupations related to the subjects they teach.

Public libraries have books, pamphlets, and magazine articles with occupational information. The librarian can help you a great deal in directing you to the information best suited to your needs.

Business establishments are often willing to supply information about the work they perform, the types of jobs they have available, and the qualifications needed. The names of local firms can be found in the classified section of your telephone directory or can be obtained from your local chamber of commerce. If the firm is a large one, it's a good idea to contact the director of personnel.

Trade unions, employers' associations, and professional societies frequently have local branches. Often, staff members can supply career information for the occupations or industries with which they are concerned.

Private employment agencies can provide a great deal of information and assistance to jobseekers. These agencies, which ordinarily charge a fee for their services, employ counselors to assist clients with their career planning and placement. Because they are located in cities and towns throughout the country, private employment agencies can be an excellent source of information about job opportunities in local areas. They are listed in local telephone directories, and advertise in newspapers and magazines.

State Employment Service offices are in particularly good position to provide information about jobs, hiring standards, and wages in your locality. Public Employment Service agencies in each State are affiliated with the U.S. Employment Service of the U.S. Department of Labor, and provide their services without charge. Operating through a network of local offices, State agencies help jobseekers find employment and help employers find qualified workers.

Whether you are looking for a job right now, or exploring career possibilities for the future, your local Employment Service office can help. Depending on your particular needs, you can obtain information on jobs in your local area, employment counseling, referral to training programs, and placement services, as follows:

Information on local job opportunities can be obtained from the Job Information Service (JIS). These special units have been set up in many local offices of the Employment Service. They permit jobseekers to select jobs from a computerized listing of opportunities in the area. These listings, which are updated daily, provide information from employers on specific openings. The JIS also furnishes general information on occupational trends, industrial developments, job opportunities in State and Federal government, and promotional materials from associations and unions. Information on jobs in other parts of the country is available as well.

Employment counseling is available from trained Employment Service counselors to assist young people starting their careers, as well as experienced workers interested in changing jobs. Counselors help people determine their actual and potential abilities, interests, and personal traits, to help them make the best use of their capacities in the light of available jobs. Most counselors in Employment Service offices make use of USES aptitude tests when appraising an individual's aptitudes, interests, and clerical and literary skills.

Referral to training programs is another service. When individuals seek work for which they are not qualified, the Employment Service may suggest programs that provide a specific skill.

Placement services also are available. Placing workers in jobs is a primary objective of the public Employment Service, and registered applicants are directed to employers who have vacancies to fill. Requests are received from employers for many different kinds of workers. As a result, registered applicants have access to knowledge of a variety of vacancies, just as the employer has access to many applicants.

Certain groups of jobseekers are given special consideration by public employment offices. These include veterans legally entitled to priority in all services, with preferential treatment for disabled veterans over others. In addition, the Vietnam Era Veterans Readjustment Assistance Act requires that some specific form of assistance, designed to enhance employment prospects, be given to each veteran who applies to the Employment Service. Each local office has a Veterans' employment representative assigned the responsibility of seeing that these priority services are provided by all local office staff.

The Employment Service also maintains a year-round program of services for youth, including counseling, job development, placement, training, and referral to other agencies. Special efforts include the Summer Employment Program, in which the Employment Service tries to develop as many jobs as possible for disadvantaged youth. Another special program provides placement services to graduating seniors, school dropouts, and potential dropouts who want to work.

Other groups facing special difficulties in obtaining suitable employment are given special consideration by the Employment Service too. This may include referral for supportive services, such as provision of child care to enable the parent to work, or health examinations or referral to training which will help develop the jobseeker's employability. For individuals with mental or physical disabilities, assistance in making realistic job choices and overcoming problems related to getting and holding jobs is available. For middle-aged and older workers placement efforts which take into account their particular problems have been developed. Similar attention is given to the unique employment problems of minority group members, and to the difficulties encountered by disadvantaged jobseekers.

ASSUMPTIONS AND METHODS USED IN PREPARING THE EMPLOYMENT PROJECTIONS

Although the discussions of future job prospects contained in this publication are written in qualitative terms, the analyses upon which they are based begin with quantitative estimates of projected employment, replacement openings, and—in a few cases—supply.

These projections were developed using data on population, industry and occupational employment, productivity, consumer expenditures, technological innovation, and other factors expected to affect employment growth. The Bureau's other research programs provided much of this data, but many other agencies of the Federal Government were important contributors, including the Bureau of Apprenticeship and Training and the U.S. Employment Service, Employment and Training Administration, Department of Labor; the Bureau of the Census, Department of Commerce; the Office of Education and the Rehabilitation Services Administration, Department of Health, Education, and Welfare; the Veterans Administration; the Civil Service Commission; the Interstate Commerce Commission; the Civil Aeronautics Board; the Federal Communications Commission; the Department of Transportation; and the National Science Foundation.

In addition, experts in industry, unions, professional societies, and trade associations furnished data and supplied information through interviews. Many of these individuals also reviewed preliminary drafts of the statements. The information presented in each statement thus reflects the knowledge and judgement not only of the Bureau of Labor Statistics staff, but also of leaders in the fields discussed, although the Bureau, of course takes full responsibility.

After the information from these sources was compiled, it was analyzed in conjunction with the Bureau's model of the economy in 1985. Like other models used in economic forecasting, it encompasses the major facets of the economy and represents a comprehensive view of its projected structure. The Bureau's model is comprised of internally consistent projections of gross national product (GNP) and its components—consumer expenditures, investment, government expenditures, and net exports; industrial output and productivity; labor force; average weekly hours of work; and employment for detailed industry groups and occupations. The methods used to develop the employment projections in this publication are the same as those used in other Bureau of Labor Statistics studies of the economy. A detailed description of these methods appears in The U.S. Economy in 1985, BLS Bulletin 1809.

Assumptions. The Bureau's projections to 1985 are based on the following general assumptions:

The institutional framework of the U.S. economy will not change radically.

Current social, technological, and scientific trends will continue, including values placed on work, education, income, and leisure.

The economy will gradually recover from the high unemployment levels of the mid-1970's and reach full employment (defined as 4 percent unemployment) in the mid-1980's.

No major event such as widespread or long-lasting energy shortages or war will significantly alter the industrial structure or the rate of economic growth.

Trends in the occupational structure of industries will not be altered radically by changes in relative wages, technological changes, or other factors.

Methods. Beginning with population projections by sex, and race developed by the Bureau of the Census, a projection of the total labor force is derived using expected labor force participation rates for each of these groups. In developing the participation rates, the Bureau takes into account a variety of factors that affect a person's decision to enter the labor market, such as school attendance, retirement practices, and family responsibilities.

The labor force projection is then translated into the level of GNP that would be produced by a fully employed labor force. Unemployed persons are subtracted from the labor force estimate and the result is multiplied by a projection of output per worker. The estimates of future output per worker are based on analysis of trends in productivity growth among industries and changes in the average weekly hours of work.

Next, the projection of GNP is divided among its major components: Consumer expenditures, business investment, government expenditures—Federal, State, and local—and net exports. Each of these components is broken down by producing industry. Thus, consumer expenditures, for example, is divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Once estimates are developed for these products and services, they are translated into detailed projections of industry output, not only for the industries producing the final product, but also for the intermediate and basic industries which provide the raw materials, electric power, transportation, and other inputs required in the production process. To facilitate this translation, the Department of Commerce has developed input-output tables which indicate the amount of output produced by each industry—steel, glass, plastics, etc.—that is required to produce a final product, automobiles for example.

By using estimates of future output per man-hour based on studies of productivity and technological trends, for each industry, it is possible to derive industry employment projections from the output estimates.

These projections are then compared with employment projections derived using regression analysis. This analysis develops equations that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. By comparing projections resulting, input-output and regression analysis, it is possible to identify areas where one method produces a projection inconsistent with past trends or the Bureau's economic model, and adjust the projection accordingly.

Occupational employment projections. Projections of industry employment are translated into occupational employment projections from using an industry occupation matrix. This matrix, which is divided into 200 industry sectors and 400 occupation sectors, describes the current and expected occupational structure of each industry. By applying the projected patterns of occupational structure for each industry to the industry employment projection and aggregating the resulting estimates, employment projections for each of the 400 occupations contained in the matrix can be obtained.

In some cases employment is related directly to one of the components of the Bureau's model—for example, the number of cosmetologists is related to consumers expenditures for beauty shop services. In others, employment is related to an independent variable not explicitly projected in the model, but believed to be a primary determinant of employment in that occupation. The projection of automobile mechanics, for example, is based on the expected stock of motor vehicles. Projections that are developed independently are compared with those in the matrix and revised, if necessary, to assure consistency.

Replacement needs. In addition to developing an estimate of projected employment for each occupation, a projection is made of the number of workers who will be needed as replacements. Separations constitute a significant source of openings. In most occupations, more workers are needed to replace those who retire, die, or leave the occupation that are needed to fill jobs created by growth. Consequently, even declining occupations offer employment opportunities.

To estimate replacement openings, the Bureau has developed tables of working life based on actuarial experience for deaths and on decennial census data on general patterns of labor force participation by age and sex. Withdrawals from each occupation are calculated separately for men and women by age group and used to compute an overall separation rate for the occupation. These rates are used to estimate average annual replacement needs for each occupation over the projection period.

The effects of interoccupational transfers are not taken into account when calculating replacement needs because little information is as yet available on this type of separation.

Supply. Supply estimates used in analysis of many of the occupations presented in this publication represent the numbers of workers who are likely to enter a particular occupation if past trends of entry to the occupation continue. These estimates are developed independently of the demand estimates. Thus, supply and demand are not discussed in the usual economic sense in which wages play a major role in equating supply and demand. Statistics on college enrollments and graduations by field are the chief sources of information on the potential supply of personnel in professional, technical, and other occupations requiring extensive formal education.

II. TOMORROW'S JOBS FOR COLLEGE GRADUATES

Selecting what courses to take in college implicitly entails the task of preparing to meet the challenges of working life. Many potholes and detours can be encountered on the road from college to work if career planning is done haphazardly. The task of preparing for a future career is made more difficult if uncertainty exists about tomorrow's jobs and alternative occupational choices that will be available.

Many questions are important to young persons as they attempt to match their abilities and interests with the variety of occupational choices. What fields look promising for employment opportunities? What jobs does a college education prepare one for? Would additional graduate education greatly enhance career prospects in a particular occupation? How do earnings in certain occupations compare with earnings in others requiring similar training? What types of employers provide which kinds of jobs? Does employment in a particular job mean steady, year-round work or is the job seasonal or affected by minor swings in economic activity?

The answers to these questions change as our economy grows. New goods, services, and improved methods of production, as well as changes in living standards, life styles, and government policy constantly alter the types of jobs that become available. This chapter explores how changes in our industrial and economic framework affect the outlook for employment in specific occupations. It also discusses briefly the implications of these changes for employment opportunities for college graduates.

No one can forecast the future with certainty. Nevertheless, by using the wealth of information available, and economic and statistical analysis, the work future can be broadly sketched. Of course, some aspects of the future can be predicted more accurately than others. For example, the population in 1985 can be estimated with a high degree of accuracy because changes in the rate of population growth occur very slowly. On the other hand, forecasting employment in a specific occupation is quite difficult. The demand for scientists, for example, would change quite rapidly if a major research and development program were initiated.

But before projecting the demand for workers in the economy, a number of basic assumptions must be made about broad national policy and social, technological, and business conditions. The employment outlook pictured in this publication is drawn within the following fundamental assumptions:

—The institutional framework of the U.S. economy will not change radically.

—Current social, technological, and scientific trends will continue including values place on work, education, income, and leisure.

—The economy will gradually recover from the high unemployment levels of the mid-1970's and reach full employment (4 percent unemployment) in the mid-1980's.

—No major event such as widespread or long-lasting shortages or war will significantly alter the industrial structure of the economy or alter the rate of economic growth.

—Trends in the occupational structure of industries will not be altered radically by changes in relative wages, technological changes, or other factors.

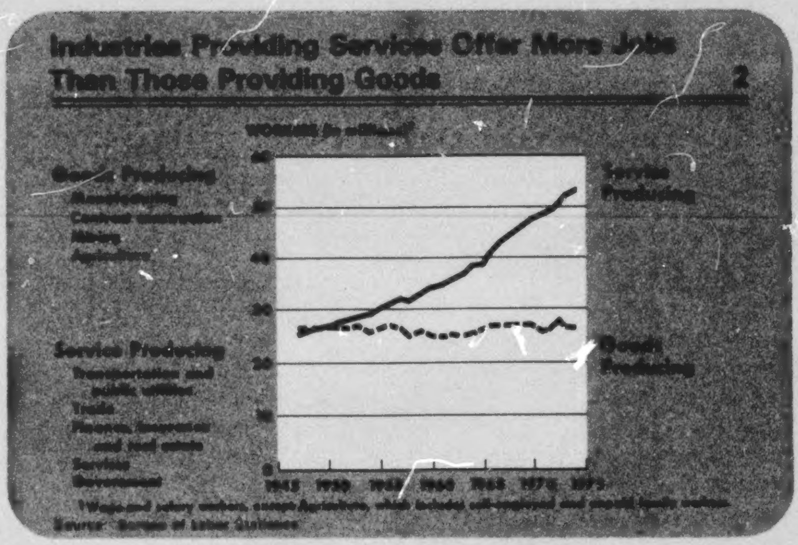
The following assessment of industrial and occupational outlook begins with a projection of the total labor force. By 1985, approximately 109.7 million persons will be in the labor force. About 2.1 million will be members of the Armed Forces; the remainder makes up the civilian labor force—107.6 million. This represents a projected 18 percent increase in the civilian labor force over the 1974–85 period.

The growth of individual industries and occupations will differ, however, from that of the total labor force. The following sections discuss the projected growth of industries and occupations, and describe the effect of this growth on tomorrow's jobs.

INDUSTRIAL PROFILE

To help understand the Nation's industrial composition, industries may be viewed as either goods-producing or service-producing. They may be further grouped into nine major divisions according to product or service. (See chart 1.)

Most of the Nation's workers are in industries that produce services—in activities such as education, health care, trade, repair and maintenance, government, transportation, banking, and insurance. The production of goods—raising food crops, building, extracting minerals, and manufacturing—requires only about one-third of the country's work force. (See chart 2.) In general, job growth through the mid-1980's is expected to continue to be faster in the service-producing industries than in the goods-producing industries. However, among industry divisions within both the goods-producing and service-producing sectors, the growth patterns will continue to vary. (See chart 3.)



Industries Providing Services Offer More Jobs Than Those Providing Goods 2

¹Wage and salary workers, except Agriculture, which includes self-employed and unpaid family workers.

Source: Bureau of Labor Statistics

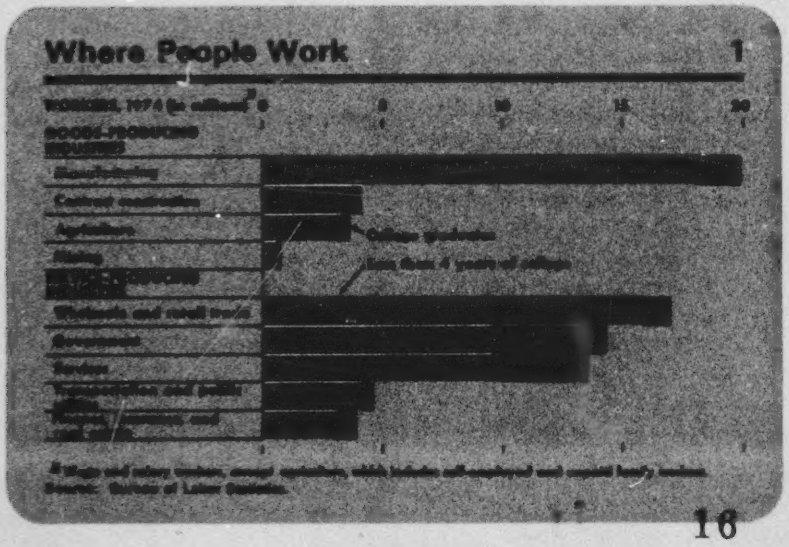
Service-producing industries

In 1974, about 53.7 million workers, almost 20 million more than in 1960, were on the payroll of service-producing industries—trade; government; services and miscellaneous; transportation and other utilities; and finance, insurance, and real estate. The major factors underlying this rapid growth were (1) population growth, (2) increasing urbanization with its accompanying need for more city services, and (3) rising incomes and living standards accompanying a demand for improved services, such as health and education. These factors are expected to continue to result in rapid growth of service industries as a group, and they are expected to employ 71.5 million workers by 1985, an increase of about 33 percent over the 1974 level.

In 1974, nearly 20 percent of all workers in service-producing industries, or about 10.5 million, were college graduates. Through the mid 1980's, employment of college graduates is expected to increase more rapidly than other groups in the service-producing industries.

Trade, the largest division within the service-producing industries, has expanded sharply since 1960. Wholesale and retail outlets have multiplied in large and small cities to satisfy the need of our highly urban society. Employment in trade was about 17 million in 1974, about 49 percent above the 1960 level. Nearly 1.1 million workers, 6.2 percent of all employment in trade in 1974, were college graduates.

Employment in trade is expected to grow by about 22 percent between 1974 and 1985. Although an ever-increasing volume of merchandise will be distributed as a result of increases in population and consumer expenditures, the rate of increase in manpower needs will be slowed by laborsaving technology such as the greater use of electronic data processing equipment and automated



Where People Work 1

²Wage and salary workers, except agriculture, which includes self-employed and unpaid family workers.

Source: Bureau of Labor Statistics.

warehousing equipment, and by growth in the number of self-service stores, and vending machines. Technological advances and upgrading the educational requirements for many trade jobs should produce rapid growth in the employment of college-educated workers in wholesale and retail trade.

Government employment has grown faster than employment in any other industry division, increasing between 1960 and 1974 by about 70 percent from 8.4 million to 14.3 million. Growth has been mostly at the State and local levels, which together expanded by 90 percent. Employment growth has been greatest in agencies providing education, health, sanitation, welfare, and protective services. Federal Government employment increased about 20 percent between 1960 and 1974.

Government is a major area of employment for college-educated workers. Nearly a third of all government employees, 4.6 million in 1974, were college graduates. Government will continue to be a major source of new jobs through the mid-1980's for both college graduates and persons with less education. Employment in government is expected to grow faster than the average for other industries, rising about 35 percent over the 1974 total. Most of the growth is projected to occur in state and local agencies; at the Federal level, employment is expected to grow more slowly than the average for all industries.

Service and miscellaneous industries have increased rapidly as a result of growing needs for health services, maintenance and repair services, advertising, and domestic help. From 1960 to 1974, total employment in this industry division rose over 80 percent, from 7.4 million to about 13.5 million. About 3.6 million, more than one-fourth of those employed in these industries in 1974, were college graduates.

Service and miscellaneous industries are projected to continue to be among the fastest-growing industries through the mid-1980's. More than half again as many workers are expected to be employed in this industry division in 1985 as in 1974, and requirements for college-educated workers should increase substantially. Employment requirements in health services are expected to grow rapidly due to population growth and the increasing ability of persons to pay for health care. Business services, including accounting, data processing, and maintenance services, also are expected to grow rapidly.

Transportation and public utility employment of 4.7 million in 1974 was about 17 percent higher than in 1960. Different parts of this industry, however, have experienced different growth trends. For example, employment increased rapidly in air transportation, but declined in the railroad industry. In 1974, 7.4 percent, or 340,000, were college graduates.

The number of jobs in transportation and public utilities as a whole is expected to increase 11 percent by 1985, less than the average for other industries. Widely differing employment trends will continue to be experienced among individual industries within the division. A continued increase in employment is expected in air transportation but a decline is expected to continue in railroad employment. A slight decline also is expected in water transportation.

Finance, insurance, and real estate, smallest of the service-producing industry divisions, grew 56 percent from 1960, to more than 4.1 million in 1974. Employment has grown especially rapidly in banks, in credit agencies, and among security and commodity brokers, dealers, exchanges, and services. In 1974, college graduates comprised 21 percent of the workers in these industries, or 880,000 workers.

Job growth in finance, insurance, and real estate is expected to outpace the overall increases in nonfarm employment through the mid-1980's. Employment is projected to be about 35 percent higher than in 1974.

Goods-Producing Industries

Employment in the goods-producing industries—agriculture, manufacturing, construction, and mining—which totaled more than 28.1 million in 1974, has increased slowly in recent years. Significant gains in productivity resulting from automation and other technological developments as well as the growing skills of work force have permitted large increases in output without corresponding increases in employment. In 1974, 8.2 percent of workers employed in goods-producing industries, 2.3 million persons, were college graduates.

Overall, employment in goods-producing industries is expected to increase more slowly than the average for other industries. However, widely different patterns of employment change have occurred and will continue among the industry divisions in the goods-producing sector.

Agriculture, which until the late 1800's employed more than half of all workers in the economy, employed about 4 percent, in 1974, or 3.5 million workers. The more than 200,000 college graduates comprised only 5.9 percent of all agricultural workers. Increases in the average size of farms, rapid mechanization, and improved fertilizers, feeds, and pesticides have created large increases in output even though employment has fallen sharply.

The worldwide demand for food is increasingly rapidly. Although farm employment in 1985 is expected to be below the 1974 level, the rate of decline will probably be slower than during the 1960's. College educated workers are expected to comprise an increasing proportion of agricultural employment, however, as a result of continuing technological advances and increasingly sophisticated management techniques.

Mining employed about 672,000 workers in 1974, nearly 12 percent of them college graduates. Mining employment has declined nearly 6 percent since 1960, primarily because of labor-saving technological changes. The overall trend is expected to change, and mining employment in 1985 should be about 17 percent higher than in 1974. Coal mining is expected to provide many new jobs as the cost of other fuels continues to rise and efficient ways are found to minimize the environmental impact of mining.

Contract construction employment, about 4 million in 1974, has increased about 38 percent since 1960 as a result of the Nation's growing needs for homes, apartments, offices, stores, highways, and other structures. In 1974, 5.9 percent of all persons employed in contract construction were college graduates—more than 200,000 workers.

Between 1974 and 1985, employment in contract construction is expected to grow about as fast as the average for other industries, rising by 26 percent.

Manufacturing, the largest division within the goods-producing sector, employed about 20 million workers in 1974, an increase of about 19 percent over 1960. Of all those employed in manufacturing in 1974, 1.8 million workers, or 9 percent, were college graduates. New products for industrial and consumer markets and the rapid growth of government expenditures for defense and space programs spearheaded growth during the 1960's.

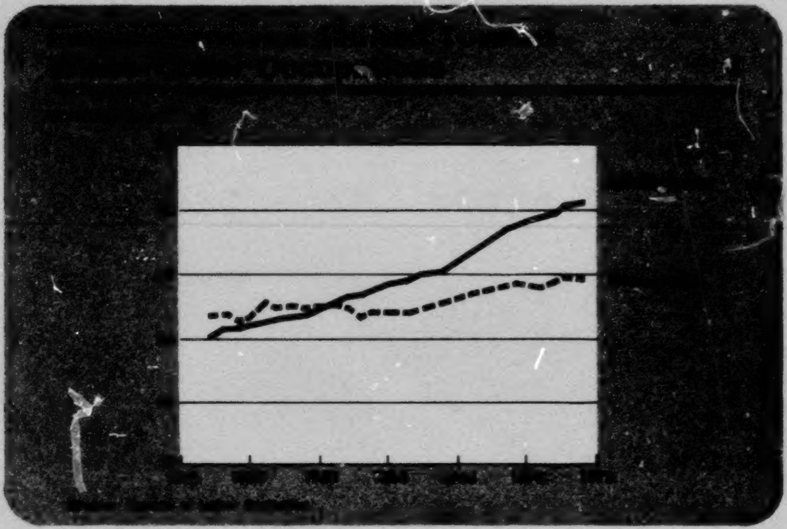
Manufacturing employment is expected to increase more slowly than the average for other industries through the mid-1980's and to reach about 22.2 million in 1985. Employment in durable goods manufacturing is projected to increase at a slightly faster rate than total manufacturing, and nondurable goods, somewhat slower; however, the rate of growth will vary among the individual manufacturing industries.

OCCUPATIONAL PROFILE

As industries continue to grow, changes will take place in the Nation's occupational structure. Jobs will become more complex and specialized, offering an even greater number of occupational choices to persons planning a career. By first studying the outlook for broad occupational groups, the task can be made more manageable. (See chart 4.)

Among the broad occupational groups, white-collar jobs have grown most rapidly over the past decade. In 1974, white-collar workers—professional, managerial, clerical, and sales—outnumbered blue-collar workers—craftworkers, operatives, and laborers by almost 12 million. (See chart 5.)

Through the mid-1980's, we can expect a continuation of the rapid growth of service and white-collar occupations, a slower-than-average growth of blue-collar occupations, and a further decline of farm workers. The rapid growth expected for service workers and white-collar workers reflects continuous expansion of the service-producing industries, which employ large numbers of these workers. The growing demand for workers to perform research and development, to provide education and health services, and process the increasing amount of paperwork throughout all types of enterprises, also will be significant in the



growth of service and white-collar jobs. The slower-than-average growth of blue-collar and farm workers reflects the expanding use of labor saving equipment in our Nation's industries and the relatively slow growth of the goods-producing industries that employ large proportions of blue-collar workers. (See chart 6.)

The following sections describe in greater detail the changes that are expected to occur among the broad occupational groups through the mid-1980's.

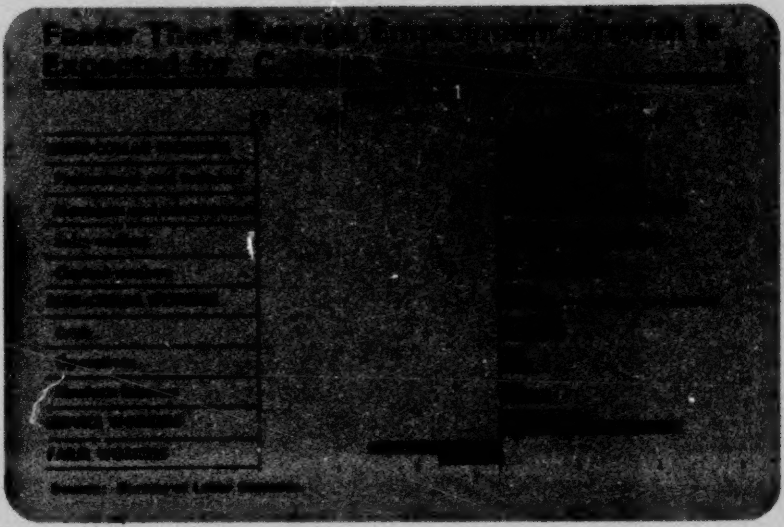
White-Collar Workers

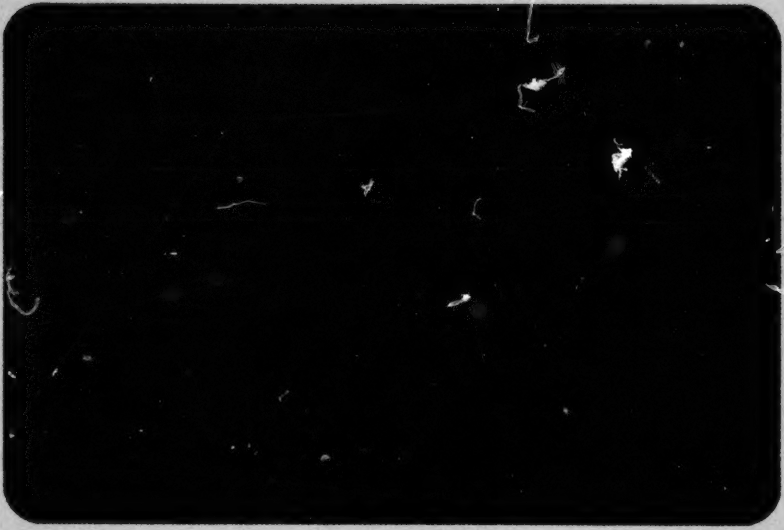
White-collar workers, who numbered 41.7 million in 1974, included about 11 out of every 12 employed college graduates. More than one quarter, or 12.1 million, of all white-collar jobs were filled by college graduates in 1974. By the mid-1980's, college graduates are expected to hold about one-third, or 17.5 million, of the 53.2 million white-collar jobs. Although the number of college graduates in white-collar jobs is expected to grow about 45 percent, their employment in some white-collar occupations will increase more rapidly. (See chart 5.) The employment outlook varies greatly for college graduates among the major white-collar occupational groups of professional and technical workers, managers and administrators, salesworkers, and clerical workers.

Professional and technical workers were the third largest occupational group in 1974, but contained the largest proportion of college graduates. (See chart 6.) Among the 12.3 million professional and technical workers were more than 7.7 million college graduates—over 60 percent of the total. They include such highly trained personnel as teachers, dentists, accountants, and engineers.

Professional and technical occupations are expected to grow by about 30 percent by 1985, while requirements for college graduates in this field are expected to increase 40 percent and reach 10.9 million in 1985. Workers in this area will be in great demand as the Nation makes greater efforts in transportation, energy production, rebuilding the cities, and enhancing the beauty of the land. The quest for scientific and technical knowledge is bound to grow, raising the demand for workers in scientific and technical specialties. The late 1970's and early 1980's should see a continuing emphasis on the social sciences and medical services.

Managers and administrators totaled about 8.9 million in 1974; more than one-quarter of them, or 2.5 million, were college graduates. Overall, the number of managers is projected to increase about as fast as the average for other occupa-





tions between 1974 and 1985. Requirements for college graduates in managerial and administrative jobs, primarily salaried positions, are expected to increase 60 percent over the period. As in the past, requirements for salaried managers are likely to continue to increase rapidly because of the growing dependence of business organizations and government agencies on management specialists. On the other hand, the number of self-employed managers is expected to continue to decline as the trend toward larger businesses continues to restrict growth of the total number of firms, and as supermarkets continue to replace small groceries and general stores.

Salesworkers, accounting for about 5.4 million workers in 1974, are found primarily in retail stores, manufacturing and wholesale firms, insurance companies, and real estate agencies, as well as offering goods door-to-door. In 1974, the nearly 900,000 college graduates employed comprised about 16 percent of all salesworkers.

Salesworkers are expected to increase about 16 percent between 1974 and 1985. Salesworker employment will grow as population growth and business expansion increase the demand for a wide range of goods and services.

Employment of college graduates in sales jobs is expected to grow more than 50 percent by the mid-1980's. Over 21 percent, or 1.35 million, of the 6.3 million salesworkers expected to be employed in 1985 will be college graduates. The rising number of college graduates expected in sales positions reflects to some extent the trend for employers to hire persons with the highest educational qualifications. An increase in the proportion of salesworkers who are college graduates, however, also reflects the changing nature of sales occupations. Sales personnel are increasingly required to have technical knowledge of the product or service being sold, especially in the manufacturing and computer fields.

Clerical workers, numbering 15 million in 1974, include workers who operate computers and office machines, keep records, take dictation, and type. Clerical workers made up the largest group of workers in 1974, but only 6.5 percent of them, or 1 million workers, were college graduates. Many new clerical positions are expected to open up as industries employing large numbers of clerical workers continue to expand. The demand should be strong for those qualified to handle jobs created by electronic data processing operations. The need for clerical workers as a group is expected to increase by about 34 percent—faster than any other occupational group—between 1974 and 1985. Because no developments which would require a college education are expected, the proportion of college graduates in this group is not expected to grow.

Blue-Collar Workers

Workers employed in skilled craft jobs, semiskilled machine and vehicle operative jobs, and laborer jobs totaled 29.8 million in 1974—35 percent of the employed labor force. The 620,000 college graduates employed, however, comprised only about 2 percent of all blue-collar workers.

Blue-collar employment is expected to increase through the mid-1980's, though at a slower rate than the average for all occupations. By 1985, blue-collar workers are expected to comprise 32 percent of all employed, or 33.7 million workers. Industrial growth and increasing business activity are generally expected to produce growth of blue-collar occupations. Technological development enabling greater automation of production, however, are expected to repress employment of blue-collar workers while raising their productivity. About 720,000 college graduates are expected to occupy blue-collar jobs in 1985.

Service Workers

Service workers include men and women who assist professional nurses in hospitals, give haircuts and beauty treatments, serve food, clean and care for homes, and provide protective services. This diverse group, which totaled 11.4 million in 1974, is expected to increase 28 percent by 1985. Factors expected to increase requirements for service workers to 14.6 million by 1985 include rising demand for hospital and other medical care; greater need for protective services as urbanization continues and cities become more crowded; and more frequent use of restaurants, beauty parlors, and other services as income levels rise and an increasing number of homemakers take jobs outside of the home.

In 1974, less than 3 percent of all service workers, or 330,000, were college graduates. This proportion is expected to increase slightly between 1974 and 1985. Expected growth of college graduate employment in service jobs will stem from increasingly sophisticated techniques used in law enforcement and other services.

Farm Workers

Farm workers—including farmers, farm managers, and laborers numbered 3.0 million in 1974. Almost 5 percent, or about 140,000 farm workers, were college graduates in 1974. Employment requirements for farm workers are expected to decline to 1.9 million in 1985 in response to continued improvements in farm technology. And although the proportion of college graduates is expected to increase substantially between 1974 and 1985, employment of college graduates in farm jobs is not expected to grow significantly.

COLLEGE GRADUATES: DEMAND AND SUPPLY, 1974–85

More than one-fifth of all job openings between 1974 and 1985 are expected to require persons who have completed 4 years or more of college. College graduates are expected to fill one-third of all white-collar job openings. Nearly 3 out of 4 openings in professional and technical occupations, and almost half of the job openings in managerial and administrative occupations, are expected to require workers who have earned their college degrees. (See chart 7.) The increasing requirements for college graduates reflect a continuing trend. The proportion of all employed persons who were college graduates grew from 10 percent in 1959 to 15.5 percent in 1974; the expectation is that this proportion will keep increasing, reaching almost 19 percent by the mid-1980's. (See table 1.)

Job openings for college-educated workers will stem from three sources: employment growth, replacement needs, and educational upgrading. Over the 1974 to 1985 period, requirements for college graduates from these three sources are expected to total 12.1 million. Growth of employment in jobs traditionally held by college graduates is expected to require 3.5 million graduates, 29 percent of total requirements. Two out of every three growth openings are expected to arise in professional and technical occupations, reflecting the expectation of continued growth of occupations which presently employ substantial numbers of college graduates.

More than half of the requirements for college graduates over the 1974 to 1985 period are expected to result from the need to replace college graduates who die, retire or otherwise leave the labor force. The bulk of the replacement openings are also expected to arise in professional and technical occupations.

About 18 percent of the requirements for college graduates are expected to come from increasing education prerequisites in jobs not previously requiring a college degree. "Educational upgrading," or rising entry requirements, results primarily from the changing nature or content of existing jobs. College graduates will be sought for some jobs traditionally held by less educated workers due to the increasingly complex skills required for those jobs. For example, as computers and other technical ad-

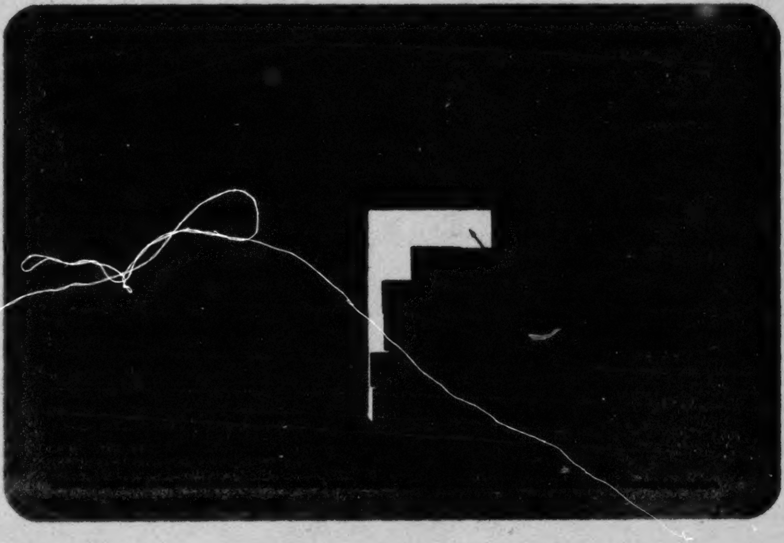


Table 1. Percent of workers in major occupational groups having 4 years or more of college education, selected years, 1959–74, and projected 1985

Year	All occupational groups	Professional, and technical	Managers, and administrators	Sales workers	Clerical workers	Service workers	Craft workers	Operatives	Laborers	Farm workers
1959	10.0	56.1	13.1	10.1	4.9	1.4	2.1	0.8	0.5	1.4
1962	11.5	57.5	15.5	11.7	5.8	1.5	1.6	.9	.7	1.5
1964	11.7	59.2	16.2	10.6	5.3	1.4	1.6	1.0	.8	2.2
1965	12.0	58.8	17.7	9.8	5.5	1.3	2.1	.8	.9	1.7
1966	12.1	59.1	19.6	11.3	4.8	1.1	1.7	.6	.4	1.8
1968	12.8	59.4	20.6	10.7	4.7	1.3	1.6	.7	.7	1.2
1969	12.9	59.1	20.1	11.0	4.5	1.3	2.0	.7	.6	2.2
1970	12.8	59.8	20.1	11.8	4.7	1.3	1.8	.8	.7	1.2
1971	14.1	60.2	23.5	13.3	5.0	1.8	1.9	.9	1.6	2.3
1972	14.1	60.3	25.7	15.2	5.8	2.2	2.1	1.1	1.5	2.8
1973	14.6	62.4	26.4	15.5	5.5	2.5	2.7	1.2	1.3	4.3
1974	15.5	62.9	28.0	16.5	6.5	2.9	3.1	1.5	1.4	4.8
Projected 1985	18.6	68.0	36.2	21.5	6.5	3.5	3.1	1.5	1.4	6.1

NOTE: Data for 1960, 1961, 1963 and 1967 not available.
SOURCE: Bureau of Labor Statistics

vances continue to effect an ever-broadening range of jobs, college-educated workers will be needed to use their capabilities efficiently. For other jobs, an understanding of complex legal and regulatory constraints imposed on business and industry is becoming increasingly essential.

Educational upgrading in a wide range of managerial and administrative jobs, as well as professional and technical jobs, is anticipated. For example, increasing reliance by business and government on salaried management specialists and the historical decline in the number of self-employed managers both suggest continued educational upgrading in managerial occupations. Upgrading of many sales jobs also is expected as sales workers are increasingly required to have technical knowledge in order to better demonstrate and adequately explain the product or service they are selling. Professional and technical jobs will continue to be upgraded as certification and licensing requirements become more widespread in many occupations, and increasing numbers of new college curriculums will be developed to meet the specialized educational needs of occupations.

What might be considered educational upgrading, however, may simply be a reflection of employers' response to the greater availability of college graduates in the labor market. Many employers have long preferred to hire college graduates for various jobs, but were not able to hire them in the 1960's when supply-demand conditions favored the college graduates. However, as a surplus of college graduates began to appear in the early 1970's employers have hired college graduates to fill an increasing number of positions traditionally not requiring a college degree.

The projection of 12.1 million openings for college graduates, discussed above, is based on the assumption that the percent of college graduates in clerical and blue-collar occupations will remain at 1974 levels through 1985. Proportions for other groups are expected to increase as they have done in the past. (See table 1.)

The supply of college graduates in the labor force is expected to continue to increase by record numbers each year through the 1970's as increasing number of college degrees are awarded. By 1985, college degrees awarded each year are expected to have increased by 15 percent over the number awarded in 1974.

Between 1974 and 1985, 16.1 million college degrees are expected to be awarded: 11.4 million bachelor's, 3.6 million master's, 440,000 doctor's, and 690,000 first professional degrees such as law, medicine, or theology. Although these expected college graduates represent potential new entrants to the labor force, not all can be considered part of the effective new supply of college educated workers. For example, most master's and doctor's degree recipients are employed before receiving their advanced degrees and are already considered part of the supply of college graduates in the labor force. Many other degree recipients, especially those holding bachelor's degrees, delay entry into the civilian labor force to continue their education, enter the Armed Forces, or become full-time homemakers.

The supply of college graduates expected to actually enter the civilian labor force from 1974 to 1985 will total 13.1 million. (See chart 8.) On the basis of past patterns of entry into the labor force by college graduates, 8 out of 10 of the entrants are expected to come directly from college. Expected are 9.1 million bachelor's degree recipients, more than 1.2 million master's degree recipients, 15,000 doctor's degree recipients, and 540,000 holders of first professional degrees. In addition, 2.25 million college graduates are expected to enter or re-enter the civilian labor force from sources other than the Nation's colleges and universities. They include re-entrants to the labor force, persons separating from the Armed Forces, and immigrants and persons returning to the United States after living in a foreign country.

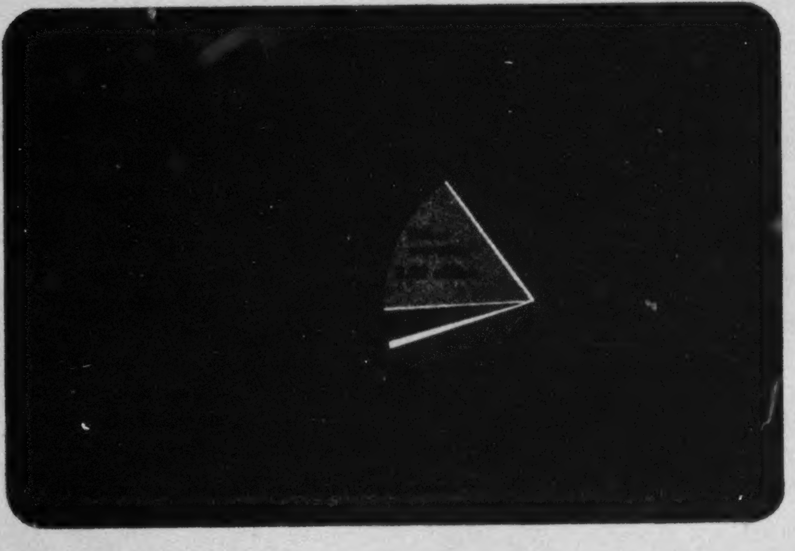
Based on this analysis, the number of persons with college degrees entering the labor force over the 1974–85 period would be about 950,000 above the number of projected job openings. This does not necessarily mean that college graduates will experience significant levels of unemployment. The unemployment rate of college graduates has always been lower than that of workers with less education. (See chart 9.) Instead, problems for college graduates will center on underemployment and job dissatisfaction which will likely result in increasing movement among occupations rather than unemployment. Many individuals may be forced to take jobs for which a college degree is not required—jobs in which their training is not fully utilized.

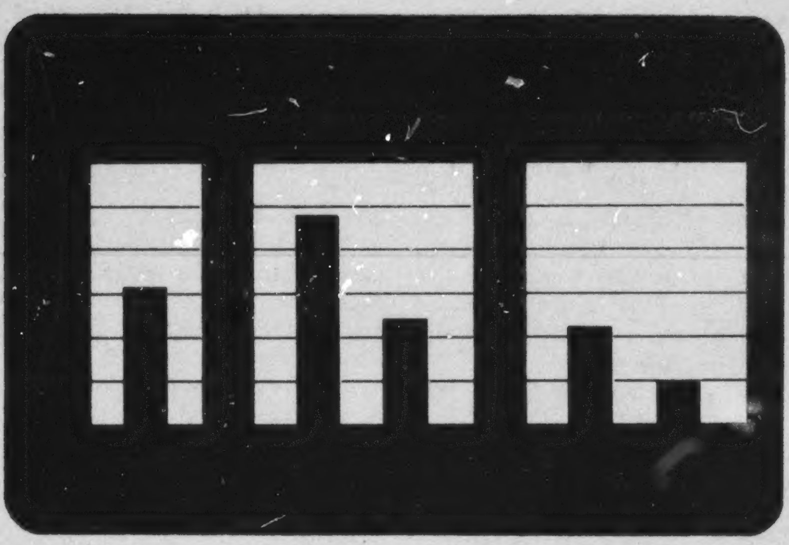
In fact, a "spillover" of college graduates into non-traditional fields has already become apparent. For example, between 1970 and 1974, the proportion of workers having four or more years of college education has increased by more than 60 percent in clerical, service and blue-collar occupations—areas which have traditionally had very small proportions of college graduates. Although the proportions have remained relatively small, more than one-half of all workers are employed in these three major groups. Consequently, the numerical effect of these increases has been great; the estimated number of college graduates currently employed in these occupations is about 750,000 higher than would have been expected had trends during the 1960's continued.

It is likely that some spillover has even occurred in major groups which have characteristically employed larger proportions of college graduates. Growth since 1970 in the proportions of college graduates in the professional-technical, managerial and sales groups has been substantially faster than it was through the 1960's, indicating perhaps that some occupations in these groups have helped to absorb a surplus of college graduates.

The "spillover" has been caused—at least in part—by generally poor economic conditions during the 1970–75 period. Aerospace cutbacks and the recession of 1970–71, followed by an oil embargo in 1973–74 and recession in 1974–75 have dramatically slowed the economy's growth during the first half of this decade. As a result, employers' hiring needs have been significantly reduced.

Just as job offers to new college graduates have suffered a general decline, the number of college graduates entering the labor force each year (including re-entrants) has increased rapidly, nearly doubling since 1970. Some persons with college degrees, having lost their jobs because of economic conditions, have begun to seek alternative employment. Moreover, in addition to the ever increasing number of new college graduates seeking jobs, many persons have entered the labor force who in better times would not have looked for work. For example, an increasing number of graduate students have likely been forced to supplement educational grants and loans with at least part-time employment. Economic necessity has also helped to draw many homemakers into the labor force—a significant number of whom hold college de-





grees and would be expected to compete directly with new college graduates for the best jobs.

The oversupply also is likely to have an adverse effect on those with less education. In the future, workers without college degrees are expected to have fewer opportunities to advance to professional positions in fields such as engineering and accounting, as well as to higher level managerial, sales, and service jobs. Thus, while college graduates are expected to face competition for jobs, those without a college education are likely to encounter even greater competition for the better jobs.

On the other hand, in some occupations, graduates of four-year colleges are likely to face unprecedented competition from community and junior college graduates. Community colleges and other post-secondary institutions have shown that they can train students for many occupations in 2 years or even less, and the number of students completing career education programs in these institutions is increasing rapidly.

The remainder of this publication discusses the outlook for various occupations requiring a college degree for entry. Although an oversupply of college graduates is generally expected, the outlook for individual occupations varies a great deal. For example, shortages of graduates with the education required to become engineers is expected, if past trends continue. On the other hand, a surplus of graduates in teaching and the biological sciences is expected. This highlights the importance of careful career planning while in high school and college. By selecting courses of study in light of what the future world of work will be like, students can graduate from college with the most marketable types of education and training. The *Occupational Outlook for College Graduates* and career guidance counselors can provide valuable assistance in this regard.

III. OCCUPATIONS

OFFICE OCCUPATIONS

Office workers perform a wide range of tasks that are needed to keep business and other organizations running on a day to day basis. Clerical workers, such as secretaries and typists, maintain files, type, and operate office machines. Professional and technical employees give legal advice, prepare and analyze financial reports, design computer systems, and arrange bank loans.

Opportunities in office work exist for people with widely different educational backgrounds. Some jobs can be entered with only a high school education; many others, however, require at least a college degree.

Many clerical employees work with things and often do detailed, repetitive tasks. Most professional office workers, on the other hand, work with ideas; they apply their skills to solving problems and devising ways to provide better services to those who depend on them. Besides the technical skills required to do their jobs, office workers need judgment and the ability to communicate their ideas to others.

This section describes a number of administrative occupations, including city managers, accountants, credit officials, and personnel workers.

ADMINISTRATIVE AND RELATED OCCUPATIONS

Most administrative workers are professional office employees who run, or help run, business and other organizations. Some are managers, who supervise, plan operations and make company policy. Others provide assistance to management, such as personnel workers who recruit and hire staff members and handle employee problems. The success or failure of an organization depends heavily on the way administrative workers do their jobs.

Nearly all administrative jobs require a college degree, although employers vary in the specific area of study they prefer. Some seek business administration or liberal arts graduates; others want a background in technical area such as engineering or science.

Many administrative workers solve problems and make decisions, using numbers and technical data. In addition, these workers must be tactful and able to get along with others. They must be able to handle the uneven flow of work in offices.

This section describes several administrative occupations including City Managers, Accountants, Credit Officials, and Personnel and Labor Relations workers.

ACCOUNTANTS

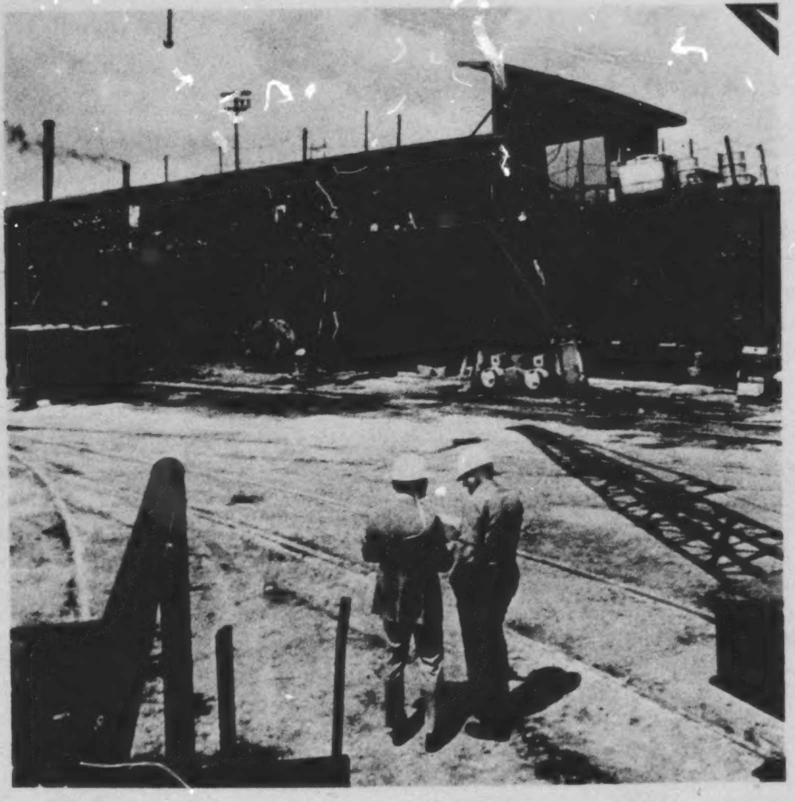
(D.O.T. 160.188)

Nature of the Work

Managers must have up-to-date financial information to make important decisions. Accountants prepare and analyze financial reports that furnish this kind of information.

Three major accounting fields are public, management, and government accounting. Public accountants have their own businesses or work for accounting firms. Management accountants, also called industrial or private accountants, handle the financial records of the company they work for. Government accountants examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often concentrate on one particular phase of accounting. For example, many public accountants specialize in auditing (reviewing a client's financial records and reports to judge their reliability). Others specialize in tax matters, such as preparing income tax forms and advising their clients of the advantages and disadvantages of certain business decisions. Still others become specialists in management consulting and give advice on a variety of matters. They might develop or revise an accounting system to serve the



CPA familiarizes himself with plant operations before beginning financial audit.

needs of clients more effectively or give advice about different types of accounting equipment.

Management accountants provide the financial information executives need to make sound business decisions. They may choose to work in areas such as taxation, budgeting, or investments. Internal auditing is an area of specialization within management accounting which is rapidly growing in importance. Accountants who work as internal auditors examine and evaluate their firm's financial systems and management control procedures to ensure efficient and economical operation.

Many accountants in the Federal Government work as Internal Revenue agents, investigators, and bank examiners; other government accountants have regular accounting positions.

Places of Employment

About 805,000 people worked as accountants in 1974; almost 20 percent were Certified Public Accountants (CPA's). About 4 percent of CPA's and nearly 24 percent of all accountants are women. Since the early 1960's, employment of women accountants has increased more rapidly than that of men, and there is every indication that women will continue to play an increasingly active role in the occupation.

About 60 percent of all accountants do management accounting work; one-fifth of these work as internal auditors. An additional 20 percent are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. Other accountants work for Federal, State, and local government agencies, and a small number teach in colleges and universities. Opportunities are plentiful for part-time work in accounting, particularly in smaller firms.

Accountants are found in all business, industrial, and government organizations. Most, however, work in large urban areas where many public accounting firms and central offices of large businesses are concentrated. For example, over 20 percent of all accountants are employed in just four major cities: Chicago, Los Angeles; New York; and Washington, D.C.

Training, Other Qualifications, and Advancement

Training in accounting is available at colleges and universities, accounting and business schools, and correspondence schools. Although many graduates of business and correspondence schools are successful in small firms, most large public accounting and business firms require applicants to have at least a bachelor's degree in accounting or a closely related field. Many employers prefer those with the master's degree in accounting. A strict accounting background usually is not required for starting jobs as internal auditors; however, training in business management, industrial relations, business law, and mathematics is helpful. A growing number of large employers prefer applicants who are familiar with computer technology for both accounting and internal auditor positions. For beginning accounting positions, the Federal Government requires 4 years of college training (including 24 semester hours in accounting or related subjects) or an equivalent combination of education and experience. For teaching positions, most colleges and universities require at least the master's degree or the Certified Public Accountancy Certificate.

Previous work experience in accounting can help an applicant get a job. Many colleges offer students an opportunity to gain experience through internship programs conducted by public accounting or business firms.

Anyone working as a "certified public accountant" must hold a certificate issued by the State board of accountancy. All states use the CPA examination, administered by the American Institute of Certified Public Accountants, to establish certification. Most successful candidates have college degrees, and three-fourths of the States require CPA candidates to be college graduates. Nearly all States require applicants to have at least 2 years of public accounting experience for a CPA certificate.

Requirements vary, but more than half the States restrict the title "public accountant" to those who are licensed or registered. Some States require only a high school diploma while others require 2 years of college or more. Information on requirements may be obtained directly from individual State boards of accountancy or from the National Society of Public Accountants.

The recognized mark of competence and experience in the field of internal auditing is the designation, Certified Internal Auditor (CIA). The Institute of Internal Auditors, Inc. confers this designation upon candidates who have completed 3 years' experience in internal auditing and who have passed a 4-part examination. Beginning in 1978, a bachelor's degree from an accredited college or university also will be required.

Persons planning a career in accounting should have an aptitude for mathematics. Neatness and accuracy also are necessary. Employers seek applicants who can handle responsibility and work with little supervision.

To get to the top in the profession, accountants usually must continue their study of accounting even though they already have college degrees or professional certificates. They may participate in seminars sponsored by various professional associations or take courses offered by their employers. A growing number of States require both CPA's and licensed public accountants to complete a certain number of hours of continuing education courses before their licenses can be renewed. An increasing number of accountants study computer operation and programming to adapt accounting procedures to new data processing methods. Although capable accountants should advance rapidly, those having inadequate academic preparation may be assigned routine jobs and find promotion difficult.

Junior public accountants usually start by assisting with auditing work for several clients. They may advance to intermediate positions with more responsibility in 1 or 2 years and to senior positions within another few years. In larger firms, those who deal successfully with top industry executives often become supervisors, managers, or partners, or transfer to executive positions in private firms. Some open their own public accounting offices.

Beginning management accountants often start as ledger accountants, junior internal auditors, or as trainees for technical accounting positions. They may advance to jobs such as chief plant accountant, chief cost accountant, budget director, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents, or corporation presidents. In the Federal Government, beginners are hired as trainees and usually are promoted in a year or so. In college and university teaching, those having minimum training and experience may receive the rank of instructor without tenure; advancement and permanent faculty status depend upon further education and teaching experience.

Employment Outlook

Employment is expected to increase about as fast as the average for all occupations through the mid-1980's as businesses and government agencies continue to expand in size and complexity. In addition to jobs resulting from growth, many thousands of openings will result each year when workers die, retire, or leave the occupation.

Demand for skilled accountants will rise as managers rely more on accounting information to make business decisions. For example, officers of large corporations base their decisions concerning proposals such as plant expansion, mergers, or foreign investments on information about the financial condition of the firm, tax implications of the proposed action, and other considerations. On a smaller scale, owners of small businesses are expected to rely more and more on the expertise of public accountants in planning their operations. Government legislation to monitor business activity also is expected to add to the demand for accountants. An example is the Pension Reform Act of 1974, which establishes minimum standards for private pension plans. This and other legislation should create many new jobs for management accountants to maintain new systems and public accountants to audit them.

Because of the growing complexity of business, college graduates will be in greater demand than applicants who lack this training. Many employers prefer graduates who have worked part time in a business or accounting firm while in school. Those who have been trained in a specific phase of accounting should find ample opportunities.

As data processing systems continue to replace manual preparation of accounting records and statements, the need for some accountants to perform routine tasks, particularly in large firms, may be reduced. However, many opportunities will arise for accountants without a college degree, mainly in small businesses and public accounting firms.

Earnings and Working Conditions

Starting salaries of beginning accountants in private industry were $9,700 a year in 1974, according to a survey in urban areas. Earnings of experienced accountants ranged between $13,300 and $19,600, depending on their level of responsibility and the complexity of the accounting system. In general, experienced accountants earn about twice as much as nonsupervisory workers in private industry, except farming. Chief accountants who direct the accounting program of a company or one of its establishments earned between $17,600 and $29,000, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged $10,400 a year, while experienced auditors' earnings ranged between $14,400 and $17,500.

Salaries generally are higher for accountants who travel a great deal or who hold a graduate degree or a CPA certificate.

In the Federal Civil Service, the entrance salary for junior accountants and auditors was about $10,200 in late 1974. Candidates who had superior academic records received a starting salary of about $11,200. Applicants with a master's degree or 2 years' professional experience began at about $12,800. Accountants in the Federal Government averaged about $23,000 a year in 1974.

Accountants who specialize in income tax preparation often work long hours under heavy pressure during the tax season; those employed by national accounting firms may travel extensively to conduct audits and perform other services for their clients. The majority, however, work in one office between 35 and 40 hours a week, under the same general conditions as fellow office workers.

Sources of Additional Information

Information about CPA's and about aptitude tests in high schools, colleges, and public accounting firms may be obtained from:

American Institute of Certified Public Accountants, 666 Fifth Ave., New York, N.Y. 10019.

Further information on specialized fields of accounting is available from:

National Association of Accountants, 919 Third Ave., New York, N.Y. 10022.

National Society of Public Accountants, 1717 Pennsylvania Ave. NW., Washington, D.C. 20006.

Institute of Internal Auditors, 5500 Diplomat Circle, Orlando, Fla. 32810.

ADVERTISING WORKERS

(D.O.T. 050.088; 132.088; 141.081 and .168; 162.158; and 164.068 through .168)

Nature of the Work

Almost every business does some form of advertising to pursuade people to buy its products or use its services. A wide variety of workers in many industries create and produce advertisements, or make arrangements for them to be broadcast on radio and television or published in newspapers and magazines. The following occupations are those most commonly associated with advertising.

Advertising managers direct the advertising program of the businesses for which they work. They determine the size of the advertising budget, the type of ads and media to be used, and the advertising agency, if any, that will be employed. Managers who decide to employ an agency work closely with the account executives assigned to their firms. They also may supervise the preparation of pamphlets, brochures, or other materials developed to promote the firm's products or services. Advertising managers working for newspapers, radio stations, and other communications media have somewhat different duties. They are responsible for selling advertising time or space, and their work is similar to that of sales managers in other businesses.

Account executives are employed by advertising agencies to develop advertising programs for clients. They study the client's sales, public image, and advertising problems and create a program that meets the client's approval. In most agencies, the actual artwork and slogans are developed by artists and copywriters, but in some small agencies, account executives are responsible for this aspect of the job. Account executives may be supervised by account supervisors; usually, however, they report directly to agency heads.

Research directors and their assistants study the market for the product or service being sold. They review its possible uses, advantages or disadvantages compared to those of competitors, and ways of reaching potential buyers. These workers may survey buying habits and motives of customers, or try out sample advertisements to find the selling theme or medium that best sells the product. (See the statement on Marketing Research Workers for more information on this occupation.)

Advertising copywriters develop the slogans and text to be used in the ads. By studying information about the product and its potential customers, they are able to write copy aimed at the particular group of customers the advertiser seeks to attract. They may specialize in writing copy for certain groups, such as business managers, teenagers, or sports lovers, or for a class of products, such as cars or computer equipment. Copywriters usually work closely with account executives. In some agencies they may be supervised by copy chiefs.

Artists and *layout workers* create the visual impact of an advertisement by selecting photographs, drawing symbols or figures, and selecting the size or type of print to be used in a magazine or newspaper ad. When television commercials are planned, they usually sketch sample scenes for the client to consider. (See the statements on Commercial Artists and Photographers for more information on this type of work.)

Media directors (or *space buyers* and *time buyers*) negotiate contracts for advertising space or air time. They determine, for example, the day and time when a television commercial would reach the largest group of prospective buyers at the least cost. To select the best medium for the advertiser, they must know the costs of using various media and the characteristics of the audience that would be reached by specific publications or television stations.

Production managers and their assistants arrange to have the ad printed for publication or filmed for television use. They must know which firms or freelance workers will be able to produce the best ad for the least cost.

Layout worker designs a newspaper ad for a department store sale.

Places of Employment

In 1974, about 170,000 people worked in jobs requiring considerable knowledge of advertising. More than one-third were employed in advertising agencies, largely concentrated in New York City and Chicago.

The rest worked for a variety of firms and industries. Many advertising workers are employed directly by organizations with products or services to sell, such as manufacturers and retail stores. Others work for television or radio stations, newspapers, and magazines and sell air time or space to advertisers. Some work for printers, art studios, and package design firms that help advertisers create their ads.

Training, Other Qualifications, and Advancement

Most employers prefer college graduates who have liberal arts training or majors in advertising, marketing, journalism, or business administration. No particular educational background, however, is equated with success in advertising. Preparing or selling ads for school publications or a summer job with a marketing research service can be helpful experience.

Some large organizations recruit outstanding college graduates for training programs that cover all aspects of advertising work. Some beginners start as research or production assistants or as space or time buyers. A few begin as junior copywriters.

Many advertising jobs require imagination, creativity, and a flair for language. Persons interested in becoming advertising managers, account executives, media buyers, and production managers must be able to get along well with people and be able to sell their ideas. Research directors and their assistants must have an understanding of human behavior. Creativity is especially important to artists, layout workers, and account executives. Advertising workers must be able to accept criticism of their work and be able to function as part of a team.

Copywriters and account executives may advance to more responsible work in their specialties, or to managerial jobs, if they demonstrate ability in dealing with clients. Some who are especially capable may become partners in an existing agency, or establish their own.

Employment Outlook

Employment of advertising workers is expected to increase about as fast as the average for all occupations through the mid-1980's, as the growing number of consumer goods and increasing competition in some product or service markets cause advertising expenditures to rise. Employment in these occupations is strongly affected by general business conditions because firms expand or contract their advertising budgets according to their financial success. Although opportunities should be favorable for highly qualified applicants, others seeking entry jobs will face keen competition because many persons are attracted to the field. Most openings will result from the need to replace workers who die, retire, or leave the occupation for other reasons.

Earnings and Working Conditions

According to the limited information available, annual salaries for beginning advertising workers with bachelor's degrees ranged from $8,000 to $10,000 in 1974. The higher starting salaries generally were paid by the largest firms or advertising agencies to outstanding applicants.

Salaries of experienced advertising workers employed by agencies varied by size of firm and type of job. For example, account executives averaged $18,000 to $25,000 a year and media directors, $20,000, according to limited information. Copywriters' salaries ranged from $15,000 for beginners to as much as $50,000 for those having print and television experience.

People in advertising work under great pressure. They are expected to produce quality ads in as short a time as possible. Sometimes they must work long or irregular hours in order to meet deadlines or make last-minute changes. Account executives, copywriters, and layout workers may become frustrated by a client's inability to define the type of ad he or she wants for a product.

Advertising can be a satisfying career for persons who enjoy variety, excitement, creative challenges, and competition. Unlike workers in many other occupations, advertising workers experience the satisfaction of having their work in print, on television, or on radio, even though they remain unknown to the public at large.

Sources of Additional Information

Information on advertising agencies and the careers they offer is available from:

American Association of Advertising Agencies, 200 Park Ave. New York, N.Y. 10017.

For a list of schools that provide training in advertising, contact:

American Advertising Federation, 1225 Connecticut Ave. NW., Washington, D.C. 20036.

BANK OFFICERS

(D.O.T. 186.118, .138, .168, and .288; 161.118, 189.118 and .168)

Nature of the Work

Practically every bank has a president who directs operations; one or more vice presidents who act as general managers or who are in charge of bank departments such as trust or credit; and a comptroller or cashier who, unlike cashiers in stores and other businesses, is an executive officer generally responsible for all bank property. Large banks also may have treasurers and other senior officers, as well as junior officers, to supervise the various sections within different departments. Banks employed almost 240,000 officers in 1974; women were about one-fifth of the total.

Bank officers make decisions within a framework of policy set by the board of directors and existing laws and regulations. They must have a broad knowledge of business activities to relate to the operations of their department. For example, loan officers evaluate the credit and collateral of individuals and businesses applying for a loan. Similarly, trust officers must understand each account before they invest funds to support families, send young people to college, or pay retirement pensions. Besides supervising financial services, officers advise individuals and businesses and participate in community projects.

Because banks offer many services, a wide choice of careers is available to workers who specialize.

Loan officers may handle installment, commercial, real estate, or agricultural loans. To evaluate loan applications properly, officers need to be familiar with economics, production, distribution, merchandising, and commercial law. Also, they need to know business operations and should be able to analyze financial statements.

Bank officers in the field of trust management require knowledge of financial planning and investment for purposes of investment research and for estate and trust administration.

Operations officers plan, coordinate, and control the work flow, update systems, and strive for administrative efficiency. Careers in bank operations include electronic data processing manager and other positions involving internal and customer services.

A correspondent bank officer is responsible for relations with other banks; a branch manager, for all functions of a branch office; and an international officer, for advising customers with financial dealings abroad. A working knowledge of a foreign country's financial system, trade relations, and economic conditions is beneficial to those interested in international banking.

Other career fields for bank officers are auditing, economics, personnel administration, public relations, and operations research.

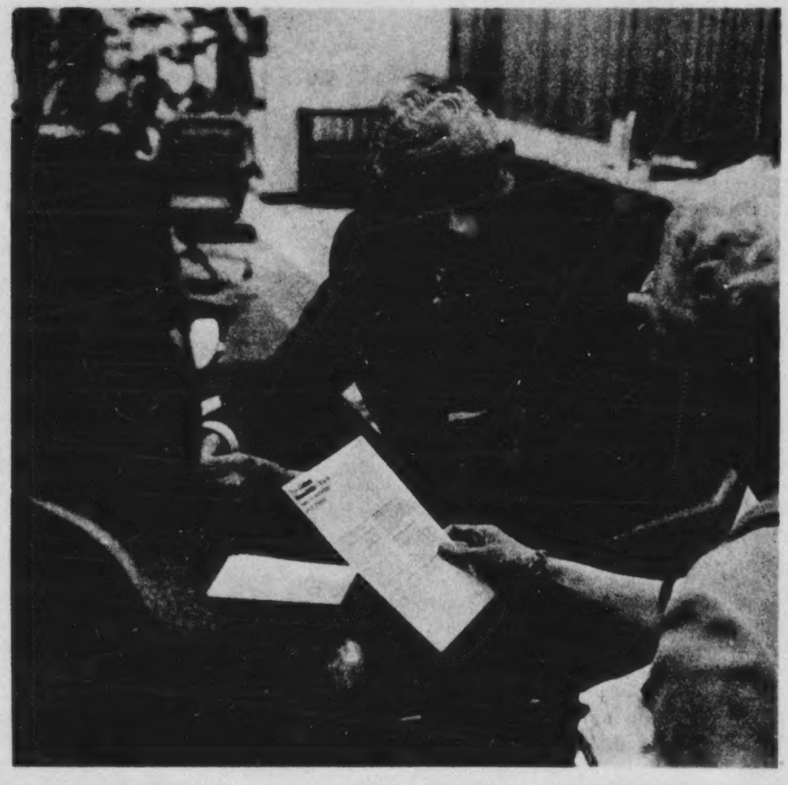
Training, Other Qualifications, and Advancement

Bank officer positions are filled by management trainees or by promoting outstanding bank clerks or tellers. College graduation usually is required for management trainees. A business administration major in finance or a liberal arts curriculum including accounting, economics, commercial law, political science, and statistics serves as excellent preparation for officer trainee positions. Valuable experience may be gained through summer employment programs.

Many banks have well-organized officer-training programs usually ranging from 6 months to 1 year. Trainees may start as credit or investment analysts or may rotate among bank departments to get the "feel" of banking; bank officials then can determine the position for which each employee is best suited.

Persons planning to become bank officers should like to work independently and analyze detailed information. They also need tact and good judgment in order to counsel customers.

Advancement to officer may come slowly in small banks where the number of positions is limited. In large banks that have special training programs, promotions may come more quickly. For a senior officer position, however, an employee usually needs many years of experience.



Although experience, ability, and leadership are emphasized for promotion, advancement also may be accelerated by special study. Courses in every phase of banking are offered by the American Institute of Banking, a long-established, industry-sponsored school.

Employment Outlook

Through the mid-1980's, employment of bank officers is expected to increase faster than the average for all occupations. The increasing dependence on computers and an expansion in the services offered by banks will require growing numbers of officers to provide sound management and effective quality control. Opportunities also will arise as experienced officers leave their jobs. College graduates who meet the standards for management trainees should find good opportunities for entry positions. However, many senior officer positions will be filled by promoting people already experienced in banking. Competition for these promotions, particularly in large banks, is likely to be keen.

Earnings

Large banks, insurance companies, and other financial institutions paid executive trainees who were college graduates starting salaries ranging from about $730 to $930 a month in 1974, according to the limited information available.

Salaries of senior bank officers may be several times as great as these starting salaries. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in big cities.

BUYERS

(D.O.T. 162.158 and 185.168)

Nature of the Work

Buyers determine which products are on display in retail stores. Although all buyers seek to satisfy their stores' customers and sell at a profit, the kind and variety of goods they purchase depend on the store where they work. A buyer for a small clothing store, for example, may purchase its complete stock of merchandise from sportswear to formal evening clothes. Buyers who work for larger retail businesses often handle one or a few related lines of goods, such as men's wear, ladies' sportswear, or children's toys. Some, known as *foreign buyers*, purchase merchandise outside the United States.

In order to purchase the best selection of goods for their stores, buyers must be familiar with the manufacturers and distributors who handle the merchandise they need. They also must keep informed about changes in existing products and the development of new ones. To learn about merchandise, buyers attend fashion and trade shows and visit manufacturers' showrooms. They usually order goods during buying trips, and also place orders with wholesale and manufacturers' salesworkers who call on them to display their merchandise.

Buyers must be able to assess the resale value of goods after a brief inspection and make a purchase decision quickly. They are aware of their stores' profit margins and try to select merchandise that will sell quickly at well above the original cost. Since most buyers work within a limited budget, they must plan their purchases to keep needed items always in stock but also allow for unexpected purchases when a "good buy" presents itself.

Because buyers purchase merchandise for their firms to resell (unlike purchasing agents who buy goods for direct use by the firm—see the statement on Purchasing Agents elsewhere in this book), they must know what motivates customers to buy. Before ordering a particular line of merchandise, buyers study market research reports and analyze past sales records to determine what products are currently in demand. They also confer with assistant buyers and sales clerks whose daily contact with customers furnishes information about consumer likes and dislikes. In addition, buyers read fashion and trade magazines to keep abreast of style and manufacturing trends; follow ads in newspapers and other media to check retail competitors' sales activities; and watch general economic conditions to anticipate consumer buying patterns.

Merchandise managers (D.O.T. 185.168) plan and coordinate buying and selling activities for large and medium-sized stores. They divide the budget among buyers, decide how much merchandise to stock, and assign each buyer to purchase certain goods. Merchandise managers may review buying decisions to insure that needed categories of goods are in stock, managers usually have very busy schedules and deal with many different people in the course of a day. and help buyers to set general pricing guidelines.

Buyers and merchandise managers usually have very busy schedules and deal with many different people in the course of a day. They work with manufacturers' represenatives, other store personnel including store executives and salesworkers, and customers. Assisting with sales promotions and creating enthusiasm among sales personnel are part of the buyer's job, and he or she may be asked to provide information such as dress sizes and product descriptions to the advertising department for a sales promotion, or to meet with floor salesworkers before a new line of merchandise is introduced. Some buyers direct assistants who handle routine aspects of purchasing such as verifying shipments; others supervise department managers.

Some buyers represent large stores or chains in cities where many manufacturers are located. The duties of these "market representatives" vary by employer; some purchase goods, while others supply information and arrange for store buyers to meet with manufacturers when they are in town.

Places of Employment

In 1974, almost 110,000 buyers and merchandise managers worked for retail firms—half of them for clothing and general department stores.

Linen buyer in a large department store discusses special order with a customer.

About 2 out of every 5 people in the occupation were women.

Although jobs for buyers are found in all parts of the country, most jobs are in major metropolitan areas were retail stores are concentrated. Market representatives work for buying offices in major market areas such as New York, Chicago, and Dallas.

Training, Other Qualifications, and Advancement

A job which traditionally has attracted career-minded people, buying offers good opportunities to begin a career in merchandising.

Most retail stores prefer college or junior college graduates for buying jobs. Courses in merchandising or marketing may help in getting a first job, but most employers accept graduates in any field of study and train them on the job. Promising salesworkers sometimes are considered for promotion to jobs at the management level, and begin as assistant buyers.

Many stores have formal training programs for all management or executive trainees, including buyers. These programs usually last from 6 to 8 months and combine classroom instruction in merchandising and purchasing with short rotations to various jobs in the store. This training introduces the new worker to store operations and policies, and provides the fundamentals of merchandising and management as well.

The trainee's first job is likely to be that of assistant buyer. The duties include supervising salesworkers, checking invoices on material received, and keeping account of stock on hand. Assistant buyers gradually assume purchasing responsibilities, depending upon their individual abilities and the size of the department where they work. Training as an assistant buyer usually lasts about a year. After about 5 years of working as a buyer, those who show exceptional ability may advance to merchandise manager. A few find further promotion to top executive jobs such as general merchandise manager for a retail store or chain. The length of time it takes to reach any of these levels depends not just on the individual's ability but on the store's need for management personnel. The faster growing the company, the more opportunity there is for a worker to acquire responsibility.

Buyers should be good at planning and decisionmaking and have an interest in merchandising. They need leadership ability and communications skills to supervise salesworkers and assistant buyers and to deal effectively with manufacturers' representatives and store executives. Because of the fast pace and constant pressure of their work, buyers need physical stamina and emotional stability.

Employment Outlook

Employment of buyers is expected to grow faster than the average for all occupations through the mid-1980's, as retail stores seek to promote sales by offering their customers a broader selection [illegible] goods. In addition to opportunities created by this growth, many job openings will arise each year from the need to replace workers who leave the occupation. Competition for these jobs is expected to be keen, for merchandising attracts large numbers of college graduates every year. Prospects are likely to be best for qualified applicants who enjoy the competitive nature of retailing, and work best in a demanding, fast-paced job.

Employment of buyers will grow as retailers put greater emphasis on the selection, display, and promotion of the goods they have for sale. This is likely to spur demand for buyers with the professional expertise to discover new sources of merchandise and select goods that will appeal to customers and make a profit for the retailer. The demand for astute buyers and merchandise managers will grow even though chain stores and other large firms are centralizing their purchasing functions and turning to the computer for routine buying and for compiling and tabulating data on past sales.

Earnings and Working Conditions

Newly hired buyers who were college graduates started at $8,300 to $9,000 a year in 1974. Some who showed unusual promise started at annual salaries of $12,000 or more.

Earnings, which frequently include a bonus in addition to regular salary, vary according to the sales volume of the store and the type of merchandise purchased. Buyers in single-store companies with yearly sales of $5-15 million earned about $10,500 in 1974; merchandise managers in these stores averaged nearly $24,000.

Buyers for discount department stores and other mass merchandising firms are among the most highly paid in the industry. Those working for mass merchandising firms with annual sales of $40-400 million earned over $21,000 in 1974, while merchandise managers earned about $36,000. A 1972 survey conducted by the Mass Retailing Institute shows that in firms with annual sales of $4 million or more, average earnings for buyers ranged from about $16,000 to $24,000, depending on the type of merchandise purchased; most buyers earned between $19,000 and $21,000. Merchandise managers made considerably more.

Buyers regulate their own hours, and often work more than 40 hours a week because of sales, conferences, and travel. The amount of traveling a buyer does varies with the type of merchandise bought and the location of suppliers, but most spend 4 or 5 days a month on the road. Merchandise managers also travel frequently, averaging several trips a month in many cases.

Sources of Additional Information

General information about a career in retailing is available from:

National Retail Merchants Association, 100 West 31st St., New York, N.Y. 10001.

Mass Retailing Institute, 570 Seventh Ave., New York, N.Y. 10018.

CITY MANAGERS

(D.O.T. 188.118)

Nature of the Work

Population growth and industrial expansion place increasing pressure on housing, transportation, and other facilities of cities. Problems associated with growing modern communities, such as air and water pollution and rising crime rates, also demand attention. To cope effectively with these problems, many communities hire a specialist in management techniques—the city manager.

A city manager is responsible to the community's elected officials who appoint him. Although duties vary by city size, city managers generally administer and coordinate the day-to-day operations of the city. They are responsible for functions such as tax collection and disbursement, law enforcement, and public works; hire department heads and their staffs; and prepare the annual budget to be approved by elected officials. They also study current problems, such as traffic congestion, crime, or urban renewal, and report their findings to the elected council.

City managers must plan for future growth and development of cities and surrounding areas. To provide for an expansion of public services, they frequently appear at civic meetings to advocate certain programs or to inform citizens of current government operations.

City managers work closely with planning departments to coordinate new and existing programs. In smaller cities that have no permanent planning staff, coordination may be assumed entirely by the manager.

Many cities employ assistant city managers, department head assistants, and administrative assistants to aid city managers. Under the manager's direction, they administer programs, prepare reports, receive visitors, answer correspondence, and generally help to keep the city functioning smoothly. Assistant city managers organize and coordinate city programs, supervise city employees, and act for the city manager in their absence. They also may assume responsibility for some projects, such as the development of a preliminary annual budget. Department head assistants generally are responsible for one activity, such as personnel, finance, or law, but also may assist in other areas. Administrative assistants, also called executive assistants or assistants to the city manager, usually do administrative and staff work in all departments under the city manager. For instance, they may compile operating statistics, or review and analyze work procedures.

City manager and staff discuss urban renewal plans with community group.

Places of Employment

About 2,900 city managers were employed in 1974. Although nearly all of them were men, in recent years a growing number of women have entered the occupation. In addition, several thousand persons worked as administrative assistants, department head assistants, and assistant city managers. Most city managers worked for cities and counties having a council-manager form of government, in which the council appoints a manager who is responsible for the day-to-day operation of the government as well as for the hiring and firing of assistants, department heads, and other staff. Most of the remainder worked in municipalities having other forms of government, such as mayor-council government in which the mayor appoints the city manager as his administrative assistant or chief administrative officer. A few city managers also worked for metropolitan or regional planning organizations and councils of governments.

Although over three-quarters of all city managers work for small cities having 25,000 or less inhabitants, many larger cities also employ a city manager. About half of the cities having a population of between 10,000 and 500,000 have city managers. City managers work in all States, but one-half are concentrated in the eastern part of the Nation.

Training, Other Qualifications, and Advancement

A master's degree, generally in public or business administration, is becoming increasingly important for those seeking a career in city management. Although some applicants with only a bachelor's degree may find employment, strong competition for positions, even among master's recipients, will make the graduate degree a requirement for most entry level jobs. In some cases, employers may hire a person with training in a field related to public administration, such as engineering, recreation, social work, or political science.

In 1974, over 150 colleges and universities offered graduate degree programs in public or municipal administration. Degree requirements in some schools include successful completion of an internship program in a city manager's office. During this internship period, which may last from 6 months to a year, the degree candidate observes local government operations and does research under the direct supervision of the city manager.

Most new graduates work as administrative assistants to city managers for several years and gain experience in solving urban problems, coordinating public services, and management techniques. Others work in an area of government operations such as finance, public works, or public planning. They may acquire supervisory skills and additional experience by working as assistant city manager or department head assistant in operations. City managers often are first employed in small cities, but during their careers, they may work in several cities of increasing size.

Young persons who plan a career in city management should like to work with detail and as part of a team. They must have sound judgment, self-confidence, and be able to perform well under stress. To handle emergency situations, city managers must quickly isolate problems, identify their causes, and provide alternate solutions. City managers should be tactful and able to communicate with and work well with people.

City managers also must be dedicated to public service since they often put in long, hard hours in times of crises.

Employment Outlook

This small occupation is expected to expand faster than the average for all occupations to the mid-1980's as problems of our growing cities become more complex. Examples of more sophisticated ways of dealing with these problems include computerized data collection of police information, advances in technology of traffic control, and the application of systems analysis to urban problems. The demand for city managers also will increase as cities convert to the council-manager form of government, currently the fastest growing form of city government. Furthermore, city managers will be needed in places having other forms of government to help elected officials cope with day-to-day operations of government.

Persons who seek beginning city management jobs as administrative assistants, department head assistants, or assistant city managers may face strong competition through the mid-1980's, especially if they do not have a graduate degree in public administration or related management experience. However, many of those unable to find employment in this area should find jobs in other fields of public administration. Competition should be keen among the growing number of administrative assistants, department head assistants, and assistant city managers for the relatively few city manager positions.

Earnings and Working Conditions

Salaries of city managers and their assistants vary according to their education and experience as well as job responsibility and size of city. Generally, city managers' earnings are very high relative to the average earnings for nonsupervisory workers in private industry, except farming. In 1974, annual salaries of city managers ranged from about $12,000 in cities of 5,000 to more than $40,000 in cities of over 250,000, according to the International City Management Association. The average annual salary for all city managers is almost $20,000. City managers in cities not having council-manager governments received slightly less.

Salaries of assistant city managers and department head assistants ranged from about $10,000 in small cities to more than $25,000 in large ones. They were generally paid about three-fourths the salaries paid city managers. Administrative assistant salaries typically ranged from $8,500 to $10,000, annually.

City managers often work more than 40 hours a week. Emergency problems may require evening and weekend work and meetings with individuals and citizen's groups consume additional time.

Fringe benefits usually include

health and life insurance programs, pension plans, sick leave, vacation time, and often a car for official business. Managers generally are reimbursed for expenses incurred while attending professional meetings and seminars.

Sources of Additional Information

For information on a career in city management, contact:

International City Management Association,
1140 Connecticut Ave. NW., Washington, D.C. 20036.

For further information on the council manager form of government, contact:

National Municipal League, 47 E. 68th St.,
New York, N.Y. 10021.

COLLEGE STUDENT PERSONNEL WORKERS

(D.O.T. 045.108, 090.118, 090.168, 129.108, and 166.168)

Nature of the Work

A student's choice of a particular institution of higher education for further study is influenced by many factors. Availability of a specific educational program, quality of the school, and cost, as well as proximity to home, may all play important roles.

For many students, an equally important factor is the institution's ability to provide for their housing, social, cultural, and recreational needs. Development and administration of these services, including educational and similar programs, provide a wide variety of jobs for college student personnel workers. The admissions officer, registrar, the dean of students, and the career planning and placement counselor are probably the best known among these. Some other types of workers that may make up this broad occupational field are student activities and college union personnel, student housing officers, counselors in the college counseling center, financial aid officers, and foreign student advisers.

Titles of student personnel workers vary from institution to institution and from program to program within a single school. Titles also vary with the level of responsibility within a certain student personnel program. The more common titles include dean, director, officer, associate dean, assistant director, and counselor.

The *dean of students*, or the vice president for student affairs, heads the student personnel program at a school. Among his or her duties is evaluating the changing needs of the students and helping the president of the college develop institutional policies. The dean of students generally coordinates a staff of associate or assistant deans; these are in charge of the specific programs that deal directly with the students.

At some schools, the admissions office and the records office are separate. *Admissions counselors* interview and evaluate prospective students and process their applications. They may travel extensively to recruit high school, junior college, and older students and to acquaint them with opportunities available at their college. They work closely with faculty, administrators, financial aid personnel, and public relations staff to determine policies for recruiting and admitting students. Personnel in the office of the *registrar* maintain the academic records of students, and provide current enrollment statistics for communication both within the college and between the college and the community.

Student financial aid personnel assist students in obtaining financial support to pay for their education. Workers in this field must keep well informed about sources of financial aid, funding, and about management of all forms of financial aid—scholarships, grants, loans, student employment, fellowships, teaching and research assistantships. They work closely with administrators and with the admissions, counseling, business, and academic office staffs.

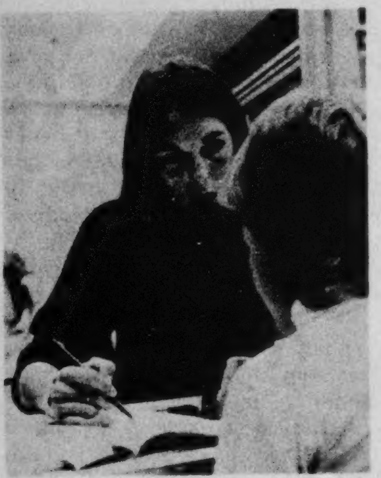
Career planning and placement counselors, sometimes called college placement officers, assist students in making long-range career selections and may also help students get part-time and summer jobs. On many campuses, they arrange for prospective employers to visit the school to discuss their firm's personnel needs and to interview applicants. (For further information on this field, see statement on College Career Planning and Placement Counselors.)

The student personnel staff in charge of *student activities* work with members of proposed and established student organizations, especially with student government. They help the student groups to plan, implement, and evaluate their activities. Often, the student activities staff will assist in the orientation of new students.

College union staff members work with students to provide intellectual, cultural, and recreational programs. Many college union staff members are responsible for directing the operation of the physical facilities and services of the building, such as food and recreational services, building maintenance, fiscal planning, conference facilities, and employee supervision.

Student housing officers sometimes live in the dormitories and, in general, help the students to live together in harmony. They may serve as counselors to individual students with personal problems. Housing officers also may be involved in managing the fiscal, food service, and housekeeping operations of student residences.

Counselors help students with personal, educational, and vocational problems. Students may come to the counselors on their own or be referred by a faculty



member, a residence hall counselor, or a friend. Counseling needs may arise from lack of self-confidence or motivation on the part of the student, failure in academic work, desire to leave college or transfer to another college, inability to get along with others, loneliness, drug abuse, or marriage problems. In addition, there is a growing trend for counselors to try to reach more students by establishing group sensitivity sessions and telephone "hotlines." Counselors often administer tests that indicate aptitudes and interests to students having trouble understanding themselves. Some also teach in the college or assist with admissions, orientation, and training of residence hall staff. (For further information on this field, see statement on Psychologists.)

Foreign student advisers administer and coordinate many of the services which are crucial in insuring a successful academic and social experience for students from other countries. They usually assist with foreign student admissions, orientation, financial aid, housing, English as a foreign language, academic and personal counseling, student-community relationships, placement, and alumni relations. In addition they may be an adviser for international associations and nationality groups and for U.S. students interested in study, educational travel, work, or service projects abroad.

Places of Employment

An estimated 50,000 college student personnel workers, roughly one-third of them women, were employed in 1974. Every college and university, whether a 2-year or a 4-year school, has a staff performing student personnel functions. They are not always organized as a unified program. Large colleges and universities generally have specialized staffs for each personnel function. However, in many small colleges a few persons may carry out the entire student personnel program.

Training, Other Qualifications, and Advancement

Because of the diversity in duties, the education and backgrounds of college student personnel workers vary considerably. A bachelor's degree is the minimum requirement; however, for some student personnel programs it is necessary to have a master's degree, and others in the field have doctoral degrees.

In 1974, more than 100 colleges and universities offered graduate programs in student personnel work. However, many employers prefer instead a graduate degree in a specific academic field added to some courses in student personnel work. A master's degree in clinical or counseling psychology is usually required for work as a college counselor. This degree also is helpful in other student personnel fields such as career planning and placement. Business administration also is helpful, especially for those who wish to go into the admissions, records, college union, financial aid, or student housing fields. Familiarity with data processing is an asset especially for work in admissions, records, or financial aid. Social science and recreation degrees also are useful, as is work experience in business, government, or educational associations. The majority, however, have degrees in education or the social sciences.

College student personnel workers must be interested in, and able to work with, people of all backgrounds and ages. They must have the patience to cope with conflicting viewpoints of students, faculty, and parents. People in this field often deal with the unexpected and the unusual; therefore emotional stability and the ability to function while under pressure are necessities.

Entry level positions are usually those of student activities advisers, admissions counselors, financial aid counselors, residence hall directors, and assistants to deans. Persons without graduate degrees may find advancement opportunities limited. A doctorate is usually necessary for the top student personnel positions.

Employment Outlook

The employment outlook of college student personnel workers is likely to be somewhat competitive through 1985. Employment is expected to remain relatively stable. Tightening budgets, in both public and private colleges and universities, is the chief factor underlying this expected lack of growth in employment. Student personnel positions least likely to be affected if some reduction in number becomes necessary are those most closely tied to the academic function of the school—admissions, financial aid, and records. Over the short run, until colleges and universities resolve their financial difficulties, most openings each year will result from the need to replace personnel who transfer to other positions, retire, or leave the field for other reasons.

During the early 1980's, however, employment of student personnel workers is expected to increase as colleges provide more services for students, especially the growing number from low-income and minority families who often require special counseling and assistance. The increasing number of college students, in junior and community colleges, is a factor which also could contribute to some growth in the student personnel occupations, especially if financial problems should ease. Two-year public colleges, for the most part, have less serious financial problems because, unlike most 4-year institutions, their enrollments are growing and their operating costs are moderate.

Earnings and Working Conditions

Median salaries of *chief student affairs officers* ranged from $13,700 in small private colleges to $29,900 in large public universities in 1974, according to a National Education Association survey of public and private colleges and universities. Median salaries of *deans of admissions* ranged from $12,700 to $22,300; for *registrars*, from $9,400 to $20,400. *Directors of student testing and counseling* had median salaries of $11,400 to $22,800. The median salaries of the other student personnel workers were somewhat lower. New entrants to the field received about $8,500 in 1974.

College student personnel workers frequently work more than a 40-hour week; often irregular hours and overtime work are necessary. Employment in these occupations is usually on a 12-month basis. In many schools, they are entitled to retirement, group medical and life insurance, and sabbatical and other benefits.

Sources of Additional Information

A pamphlet, *Careers in Higher Education*, is available from:

The American Personnel and Guidance Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

CREDIT MANAGERS

(D.O.T. 168.168)

Nature of the Work

Both businesses and individuals may require credit to meet their daily needs for a variety of goods and services. In most forms of credit granting, a credit manager has final authority over the decision to accept or reject a credit application.

In extending credit to a business (commercial credit), the credit manager, or an assistant, analyzes detailed financial reports submitted by the applicant, interviews a representative of the company about its management, and reviews credit agency reports to determine the firm's record in repaying debts. The manager also checks at banks where the company has deposits or previously was granted credit. In extending credit to individuals (consumer credit), detailed financial reports usually are not available. The credit manager must rely more on personal interviews, credit bureaus, and banks to provide information about the person applying for credit.

Particularly in large organizations, executive level credit managers are responsible for formulating a credit policy. They must establish financial standards to be met by applicants and thereby determine the amount of risk that their company will accept when offering its products or services for

Manager trainee reviews previous credit transactions.

sale on credit. Managers usually cooperate with the sales department in developing a credit policy liberal enough to allow the company's sales to increase and yet strict enough to deny credit to customers whose ability to repay their debts is questionable. Many credit managers establish office procedures and supervise workers who gather information, analyze facts, and perform general office duties in a credit department; they include application clerks, collection workers, bookkeepers, and secretaries.

In smaller companies that handle a limited number of accounts, credit managers may do much of the work of granting credit themselves. They may interview applicants, analyze the information gained in the interview, and make the final lending decision. They frequently must contact customers who are unable or refuse to pay their debts. They do this through writing, telephoning, or personal contact. If these attempts at collection fail, credit managers may refer the account to a collection agency or assign an attorney to take legal action.

Places of Employment

About 66,000 persons, nearly a third of them women, worked as credit managers in 1974. About one-half were employed in wholesale and retail trade, but many others, almost one-third of the total, worked for manufacturing firms and financial institutions.

Although goods and services are sold on credit, and cash loans granted, throughout the United States, most credit managers work in urban areas where many financial and business establishments are located.

Training, Other Qualifications, and Advancement

A college degree is becoming increasingly important for entry level jobs in credit management. Employers usually seek persons who have majored in business administration, economics, or accounting, but may also hire graduates holding liberal arts degrees. Some employers promote high school graduates to credit manager positions if they have experience in credit collection or processing credit information.

Newly hired workers normally begin as management trainees and work under the guidance of more experienced personnel in the credit department. Here they gain a thorough understanding of the company's credit procedures and policies. They may analyze previous credit transactions to learn how to recognize which applicants should prove to be good customers. Trainees also learn to deal with credit bureaus, banks, and other businesses that can provide information on the past credit dealings of their customers.

Many formal training programs are available through the educational branches of the associations that serve the credit and finance field. This training includes home study, college and university programs, and special instruction to improve beginners' skills and keep experienced credit managers aware of new developments in their field.

A person interested in a career as a credit manager should be able to analyze detailed information and draw valid conclusions based on this analysis. Because it is necessary to maintain good customer relationships, a pleasant personality and the ability to speak and write effectively also are characteristics of the successful credit manager.

The work performed by credit managers allows them to become familiar with almost every phase of their company's business. Highly qualified and experienced managers can advance to top-level executive positions. However, in small and medium-sized companies,

Employment Outlook

Credit management is an expanding field. Through the mid-1980's employment is expected to grow faster than the average for all occupations. In addition to opportunities created by this growth, many jobs will open each year from the need to replace persons who leave the occupation. Although there will be employment opportunities throughout the country, prospects should continue to be best for well-qualified jobseekers in metropolitan areas.

The volume of credit extended rose very rapidly during the past decade. In the years ahead, businesses can be expected to require increasing amounts of credit to secure raw materials for production and obtain finished goods for eventual resale. Consumers, whose personal incomes have risen, are expected to finance greater numbers of high-priced items. In addition, the use of credit for everyday purchases is expected to grow as demand increases for recreation and household goods as well as a wide range of consumer services.

Although the increasing use of computers for storing and retrieving information will allow individual credit managers to serve more customers, this should not slow the growth of the occupation. As companies handle greater numbers of credit transactions, credit managers will spend more time managing and supervising the credit handling process in their firms. Moreover, many duties of credit managers, such as customer counseling and interviewing applicants, demand the tact and good judgment only personal contact can provide.

In addition, attractive credit terms are a major tool for increasing the sales volume of almost any business. As firms strive to maximize their sales in the face of competition, there will be a greater demand for skilled credit managers who can establish credit policies strict enough to minimize bad debt losses.

Earnings and Working Conditions

In 1974, beginning credit managers earned annual salaries that ranged from about $7,500 to over $10,000, depending on the type of employer and the geographic location of the job.

As credit managers gain experience and reach middle management positions, their earnings usually range from $10,000 to $20,000 a year; with the largest employers, earnings may be as high as $25,000 or more. Some individuals in top-level positions earned salaries well over $40,000 a year.

Credit managers normally work the standard workweek of their company—35-40 hours, but some work longer hours. In wholesale and retail trade, for example, a seasonal increase in credit sales can produce a greater work volume. In addition, some credit managers attend conferences sponsored by industry and professional organizations where managers meet to develop and discuss new techniques for the management of a credit department.

Sources of Additional Information

Information about training programs available in consumer credit may be obtained from:

Society of Certified Consumer Credit Executives, 7405 University Dr., St. Louis, Mo. 63130.

For information about training programs available in commercial credit, write:

Credit Research Foundation, 3000 Marcus Ave., Lake Success, N.Y. 11040.

HOTEL MANAGERS AND ASSISTANTS

(D.O.T. 163.118 and 187.118, .168)

Nature of the Work

Hotel managers are responsible for operating their establishments profitably and satisfying guests. They determine room rates and credit policy, direct the operation of the kitchen and dining rooms, and manage the housekeeping, accounting, and maintenance departments of the hotel. They also are responsible for solving any problems that may arise.

Managers who work in small hotels may do much of the front office clerical work, such as taking room reservations and assigning rooms. In some small hotels and many motels, the manager is also the owner and may be responsible for all aspects of the business.

General managers of large hotels usually have several assistants who manage various parts of the operation. Because the hotel restaurant and cocktail lounge are important to the success of the entire establishment, they almost always are operated by managers with experience in the restaurant field. Other areas that usually are handled separately are advertising, rental of banquet and meeting facilities, personnel, and accounting.

Large hotel and motel chains often centralize some activities, such as purchasing and advertising, so that individual hotels in the chain may not need managers for these departments. Managers who work for chains may be assigned to organize a newly built or purchased hotel or to reorganize an existing hotel or motel that is not operating successfully.

About 120,000 hotel and motel managers, one-third of them women, were employed in 1974. More than a third were self-employed.

Training, Other Qualifications, and Advancement

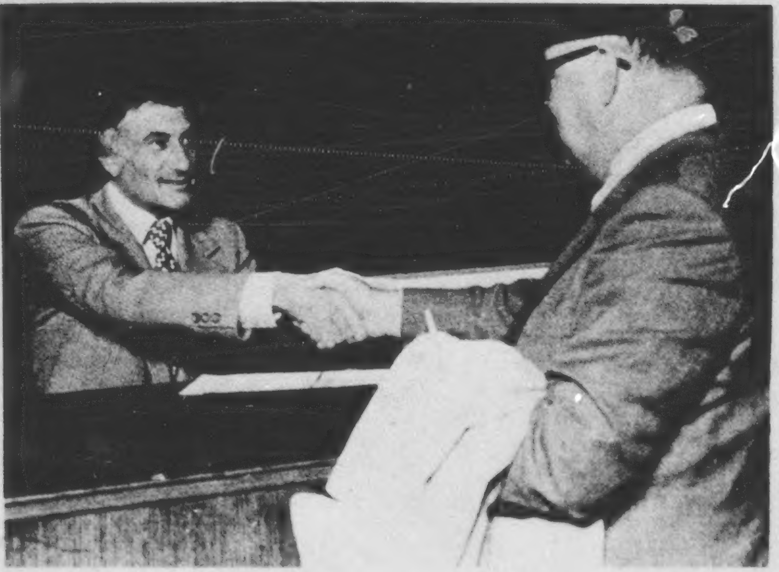
Although experience is generally the most important consideration in selecting managers, employers increasingly emphasize college education. Many believe that acquiring a 4-year college degree in hotel and restaurant administration is the best educational preparation. The courses in hotel work that are available in a few junior colleges and through the American Hotel and Motel Association also are considered helpful.

A college program in hotel management usually includes courses in hotel administration, accounting, economics, food service management and catering, and hotel maintenance engineering. Students are encouraged to work in hotels or restaurants during summer vacations because the experience gained and the contacts made with employers may help them to get better hotel jobs after graduation.

Managers should have initiative, self-discipline, and the ability to organize work and direct the work of others. They must be able to concentrate on details and solve problems.

Some large hotels have special on-the-job management trainee programs in which trainees rotate among various departments to acquire a thorough knowledge of the hotel's operation. Outstanding employees who have not had college training may receive financial assistance to help them acquire a degree.

Most hotels promote employees with proven ability, usually front office clerks, to assistant manager and eventually to general manager. Hotel chains may offer better opportunites for advancement than independent hotels, because employees can transfer to another hotel in the chain or to the central office if an opening occurs.



Hotel manager personally greets an association representative who is considering his hotel as a convention site.

Employment Outlook

Employment of hotel managers is expected to grow about as fast as the average for all occupations through the mid-1980's as additional hotels and motels are built and chain and franchise operations spread. Many openings also will occur as experienced managers die, retire, or transfer to other jobs. Applicants having college degrees in hotel administration will have an advantage in seeking entry positions and later advancement.

INDUSTRIAL TRAFFIC MANAGERS

(D.O.T. 184.168)

Nature of the Work

Industrial firms want to receive raw materials and deliver customers' goods promptly, safely, and with minimum cost. Arranging the transportation of materials and finished products is the job of an industrial traffic manager. Industrial traffic managers analyze various transportation possibilities and choose the most efficient type for their companies' needs—rail, air, road, water, pipeline, or some combination. Then they select the route and the particular carrier. To make their decisions, managers consider factors such as freight classifications and regulations, time schedules, size of shipments, and loss and damage rates. (This statement does not cover traffic managers who sell transportation services for railroads, airlines, trucking firms, and other freight carriers.)

Activities of industrial traffic managers range from checking freight bills to deciding whether the company should buy its own fleet of trucks or contract for services. They route and trace shipments, arrange with carriers for transportation services, prepare bills of lading and other shipping documents, and handle claims for lost or damaged goods. Traffic managers keep records of shipments, freight rates, commodity classifications, and applicable government regulations. They also must stay informed about changing transportation technology, such as containerization (the use of containers packed with many individual items). Some traffic managers (called physical distribution managers) are responsible for packaging shipments and maintaining warehouse facilities and transportation equipment.

Traffic managers often consult with other company officials about the firm's transportation needs. They may, for example, work with production department personnel to plan shipping schedules, or with members of the purchasing department to determine what quantities of goods can be transported most economically.

Since many aspects of transportation are subject to Federal, State, and local government regulations, traffic managers must know about these and any other legal matters that apply to their companies' shipping operations. High level traffic managers represent their companies before ratemaking and regulatory bodies such as the Interstate Commerce Commission, State commissions, and local traffic bureaus.

Places of Employment

More than 20,000 persons were industrial traffic managers in 1974. Although most jobs are found in manufacturing firms, some traffic managers work for large stores. A few are self-employed consultants, or work for firms that handle transportation problems for clients.

Training, Other Qualifications, and Advancement

Although high school graduates with experience in traffic departments sometimes are hired as traffic managers, a college education is increasingly important in this field. For some kinds of work, college training is required. To argue cases before the Interstate Commerce Commission, for example, a traffic manager must meet standards that include at least 2 years of college. Although some employers prefer graduates who have a degree in traffic management, others seek liberal arts majors who have had courses in transportation, management, economics, statistics, marketing, or commercial law.

Industrial traffic training is available through colleges and universities, traffic management schools, and seminars sponsored by private organizations. More than 100 colleges, universities, and junior colleges offer a degree in traffic management.

Industrial traffic managers should be able to analyze numerical and technical data such as freight rates and classifications to solve transportation problems. The job also requires the ability to work independently and to present facts and figures in a convincing manner.

Newly hired traffic specialists often complete shipping forms and calculate freight charges. After gaining experience, they do more technical work such as analyzing transportation statistics. A competent worker may advance to a supervisory job such as supervisor of rates and routes; a few are promoted to assistant general traffic manager and eventually to general traffic manager. Industrial traffic managers can sometimes help their chances for advancement by participating in company-sponsored training programs or taking advanced courses in traffic management.

Employment Outlook

Industrial traffic management is a relatively small occupation and is expected to grow more slowly than the average for all occupations through the mid-1980's. A few openings will become available each year as new jobs are created, and as traffic managers die, retire, or leave the field for other reasons. College graduates with a major in traffic management or transportation can expect first consideration for the available jobs.

Growth in the occupation will stem from an increasing emphasis on reducing the cost of receiving raw materials and distributing finished products. As the distance between markets becomes greater and rate schedules and regulations governing transportation more complex, manufacturers increasingly will require traffic specialists with the expertise to obtain the lowest possible freight rates.

Earnings and Working Conditions

Industrial traffic managers' salaries started at about $15,000 a year in 1974, according to the limited information available. Although earnings of experienced traffic managers vary, in general they are much higher than the average for all nonsupervisory workers in private industry, except farming. Some traffic executives earned $40,000 a year or more.

Although industrial traffic managers usually have a standard workweek, some of them have to spend time outside regular working hours preparing reports, attending meetings, and traveling to hearings before State and Federal regulatory agencies.

Sources of Additional Information

Information on education and technical training is available from:

American Society of Traffic and Transportation, Inc., 547 West Jackson Blvd., Chicago, Ill. 60606.

LAWYERS

(D.O.T. 110.108, .118, and 119.168)

Nature of the Work

At some time in our life, each of us may need a lawyer for advice about our rights and responsibilities when we buy property, make a will, or settle an estate. In addition, lawyers, also called attorneys, negotiate the settlement of legal problems out of court or, when necessary, represent clients in court or before government agencies.

Most lawyers are engaged in general practice and handle all kinds of legal work for clients. However, a significant number specialize in one branch of law, such as corporation, criminal, labor, patent, real estate, tax, or international law. Some attorneys devote themselves entirely to trying cases in the courts. Others never appear in court but instead draw up wills, trusts, contracts, mortgages, and other legal documents; conduct out-of-court negotiations; and do investigative and other legal work to prepare for trials. Some may act as trustees by managing a person's property and funds, or as executors by seeing that the provisions of their client's will are carried out. Still others teach, do research or write, or perform administrative work. Government attorneys help develop Federal and State laws and programs. They prepare drafts of proposed legislation, establish law enforcement procedures, and argue cases.

Many people who have legal training do not work as lawyers but use their knowledge of law in other occupations. They may, for example, be insurance adjusters, tax collectors, probation officers, credit investigators, or claim examiners. A legal background also is an asset to those seeking or holding public office.

Places of Employment

Over 340,000 persons worked as lawyers in 1974. Although the majority were men, increasing numbers of women are choosing careers in law. In 1974, for example, about 1 of every 5 students in American Bar Association (ABA) approved law schools was a woman.

Most lawyers are in private practice, either self-employed (alone or in partnerships) or working for other lawyers or law firms. In addition, about 22,000 lawyers worked for the Federal Government, chiefly in the Justice, Defense, and Treasury Departments, and the Veterans Administration; another 32,000 were employed by State and local governments. Others worked for private companies or taught in law schools. Some salaried lawyers also have independent practices; others do legal work part time while in another occupation.

Training, Other Qualifications, and Advancement

In order to practice law in the courts of any State, a person must be admitted to its bar. Applicants for admission to the bar must pass a written examination; however, a few States drop this requirement for graduates of their own law schools. Lawyers who have been admitted to the bar in one State usually can be admitted in another without taking an examination provided they meet that State's standards of good moral character and have a specified period of legal experience. Each Federal court or agency sets its own qualifications for those practicing before it.

To qualify for the bar examination in most States, an applicant must have completed 3 years of college and have graduated from a law school approved by the American Bar Association or the proper State authorities. A few States accept the study of law wholly in a law office or in combination with study in a law school; only California accepts the study of law by correspondence as qualification for taking the bar exam. Several States require registration and approval of students by the State Board of Examiners, either before they enter law school, or during the early years of legal study. In a few States, candidates must complete clerkships before they are admitted to the bar.

The required college and law school work usually takes 7 years of full-time study after high school—4 years of college followed by 3 years in law school. Although a number of law schools accept students after 3 years of college, an increasing number require applicants to have a bachelor's degree. To meet the needs of students who can attend only part time, a number of law schools have night or part-time divisions which usually require 4 years of study. In 1974, about one-fifth of all law students in ABA-approved schools were enrolled in evening classes.

Law schools seldom specify college subjects that must be included in students' prelegal education. However, English, history, economics and other social sciences, logic, and public speaking are important for prospective lawyers. Students interested in a particular aspect of the law may find it helpful to take related courses; for example, engineering and science courses for the prospective patent attorney, and accounting for the future tax lawyer. Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through the "Law School Admissions Test." In 1974, 156 law schools were approved by the American Bar Association. Others—chiefly night schools—were approved by State authorities only.

The first year or year and a half of law school generally are devoted to fundamental courses such as constitutional law, contracts, property law, and judicial procedure. In the third year, students may elect specialized courses in fields such as tax, labor, or corporation law. Practical experience is often acquired by participation in school-sponsored legal aid activities, in the school's practice court where students conduct trials under the supervision of experienced lawyers, and through writing on legal issues for the school's law journal. Graduates receive the degree of *juris doctor* (J.D.) from most schools as the first professional degree. Advanced study is often desirable for those planning to specialize, do research, or teach in law schools.

The practice of law involves a great deal of responsibility. Persons planning careers in law should like to work with people and ideas, and be able to win the confidence of their clients.

Most beginning lawyers start in salaried positions, although some go into independent practice immediately after passing the bar examination. Newly hired salaried attorneys usually act as research assistants (law clerks) to experienced lawyers or judges. After several years of progressively responsible salaried employment, many lawyers go into practice for themselves. Some lawyers, after years of practice, become judges.

Employment Outlook

A rapid increase in the number of law school graduates has created keen competition for the available jobs. In the years ahead, the number of graduates is expected to increase further and intensify this competition.

Employers will be very selective in hiring new lawyers. Graduates of well-known law schools and those who rank high in their classes should find salaried positions with law firms, on the legal staffs of corporations and government agencies, and as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings will experience some difficulty in finding salaried jobs. However, many will find opportunities in fields where legal training is an asset but not normally a requirement.

The employment of lawyers is expected to grow faster than the average for other occupations through the mid-1980's as increased business activity and population create a demand for attorneys to deal with a growing number of legal questions. Supreme Court decisions extending the right to counsel for persons accused of lesser crimes, the growth of legal action in the areas of consumer protection, the environment, and safety, and an expected increase in the use of legal services by middle income groups through prepaid legal service programs also should provide employment opportunities. Other jobs will be created by the need to replace lawyers who retire or leave the occupation for other reasons.

Prospects for establishing a new practice probably will continue to be best in small towns and expanding suburban areas. In such communities competition is likely to be less than in big cities and new lawyers may find it easier to become known to potential clients; also, rent and other business costs are somewhat lower. Salaried positions, on the other hand, will be limited largely to urban areas where the chief employers of legal talent—government agencies, law firms, and big corporations—are concentrated.

Earnings and Working Conditions

Lawyers entering practice in 1974 earned starting salaries ranging from about $10,000 to $12,000 a year. Factors affecting the salaries offered to new graduates include: Their academic records; types, sizes, and locations of their employers; and whether the new lawyer has any specialized educational background that the employer requires. Lawyers with at least a year's experience working in manufacturing and business firms earned about $16,000 a year; those with a few years of experience earned over $20,000 annually. In the Federal Government, annual starting salaries for attorneys were $12,841 or $15,481 in late 1974, depending upon their academic and personal qualifications. Those with a few years of experience earned $21,816 a year. On the average, lawyers earn over three times as much as nonsupervisory workers in private industry, except farming.

Beginning lawyers engaged in legal aid work usually receive the lowest starting salaries. New lawyers starting their own practices may earn little more than expenses during the first few years and may need to work part time in other occupations.

Lawyers on salary receive increases as they assume greater responsibility. In 1974, those in charge of legal staffs in private industry averaged more than $37,200 a year. Incomes of lawyers in private practice usually grow as their practices develop. Private practitioners who are partners in law firms generally earn more than those who practice alone.

Lawyers often work long hours and are under considerable pressure when a case is being tried. In addition, they must keep abreast of the latest laws and court decisions. However, since lawyers in private practice can determine their own hours and workload, many stay in practice well past the usual retirement age.

Sources of Additional Information

The specific requirements for admission to the bar in a particular State may be obtained at the State capital from the clerk of the Supreme Court or the secretary of the Board of Bar Examiners.

Information on law as a career is available from:

Information Service, The American Bar Association, 1155 East 60th St., Chicago, Ill. 60637.

Information on financial aid and law school accreditation is available from:

Association of American Law Schools, Suite 370, 1 Dupont Circle NW., Washington, D.C. 20036.

MARKETING RESEARCH WORKERS

(D.O.T. 050.088)

Nature of the Work

Businesses require a great deal of information to make sound decisions on how to market their products. Marketing research workers provide much of this information by analyzing data on products and sales, making surveys, and conducting interviews. They prepare sales forecasts and make recommendations on product design and advertising.

Most marketing research starts with the collection of facts from sources such as company records, published materials, and experts on the subject under investigation. For example, marketing research workers making sales forecasts may begin by studying the growth of sales volume in several different cities. This growth may then be traced to increases in population, size of the company's sales force, or amount of money spent on advertising. Other marketing research workers may study changes in the quantity of company goods on store shelves or make door-to-door surveys to obtain information on company products.

Marketing research workers are often concerned with customers' opinions and tastes. For example, to help decide on the design and price of a new line of television sets, marketing research workers may survey consumers to find out what styles and price ranges are most popular. This type of survey usually is supervised by marketing researchers who specialize in consumer goods; that is, merchandise sold to the general public. They may be helped by statisticians who select a group (or sample) to be interviewed and "motivational research" specialists who phrase questions to produce reliable information. Once the investigation is underway, the marketing research worker may supervise the interviewers as well as direct the office workers who tabulate and analyze the information collected.

Marketing surveys on products used by business and industrial firms may be conducted somewhat differently from consumer goods surveys. Marketing researchers often conduct the interviews themselves to gather opinions of the product. They also may speak to company officials about new uses for it. They must therefore have specialized knowledge of both marketing techniques and the industrial uses of the product.

Places of Employment

About 25,000 full-time marketing research workers were employed in 1974. Most jobs for marketing research workers are found in manufacturing companies, advertising agencies, and independent research organizations. Large numbers are employed by stores, radio and television firms, and newspapers; others work for university research centers and government agencies. Marketing research organizations range in size from one-person enterprises to firms with a hundred employees or more.

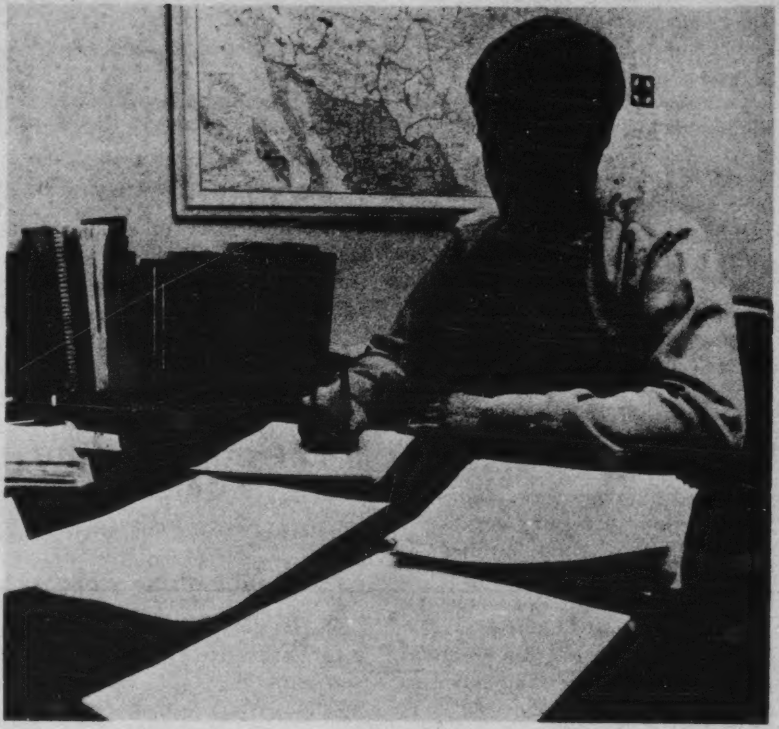
New York City has the largest number of marketing research workers. Many major advertising agencies, independent marketing organizations, and central offices of large manufacturers are located there. The second largest concentration is in Chicago. However, marketing research workers are employed in many other cities as well—wherever there are central offices of large manufacturing and sales organizations.

Training, Other Qualifications, and Advancement

Although a bachelor's degree is required for marketing research trainees, graduate training is necessary for many specialized positions and for advancement to higher level positions. Many graduates qualify for jobs through previous experience in other types of research, while employers may hire university teachers of marketing or statistics to head new marketing research departments.

College courses considered to be valuable preparation for work in marketing research are statistics, English composition, speech, psychology, and economics. Some marketing research positions require skill in specialized areas, such as engineering, or substantial sales experience and a thorough knowledge of the company's products. Knowledge of data processing is helpful because of the growing use of computers in sales forecasting, distribution, and cost analysis.

Trainees usually start as research assistants or junior analysts. At first, they may do considerable clerical work, such as copying data from published sources, editing and coding questionnaires, and tabulating survey returns. They also learn to conduct interviews and write reports on survey findings. As they gain experience, assistants and junior analysts may assume responsibility for specific marketing research projects, or advance to supervisory positions. An exceptionally able worker may become marketing research director or vice president for marketing and sales.



Either alone or as part of a team, marketing research workers must be resourceful as they analyze problems and apply various techniques to their solution. As advisers to management, they should be able to write clear reports informing company officials of their findings.

Employment Outlook

Opportunities should be best for applicants with graduate training in marketing research or statistics. The growing complexity of marketing research techniques also will expand opportunities in this field for psychologists, economists, and other social scientists.

Marketing research employment rises as new products and services are developed requiring information to identify potential buyers. The demand for new products and services will grow most quickly when business activity and personal incomes are rapidly expanding. In periods of slow economic growth, however, the demand for marketing services may be reduced and limit the hiring of research workers.

Over the long run, our growing population and the increased variety of goods and services that businesses and individuals will require is expected to stimulate a high level of marketing activity. As a result, employment of marketing research workers is expected to grow much faster than the average for other occupations through the mid-1980's.

The competition among manufacturers of both consumer and industrial products will make it increasingly important to appraise marketing situations. As techniques improve and more statistical data accumulate, company officials are likely to turn more often to marketing research workers for information and advice.

Earnings and Working Conditions

Starting salaries for marketing research trainees were about $10,000 a year in 1974, according to the limited information available. Persons with master's degrees in business administration and related fields usually started with somewhat higher salaries.

Experienced workers such as senior analysts received salaries over $16,000 a year. Earnings were highest, however, for workers in management positions of great responsibility. Vice presidents of marketing research earned well over $25,000 a year in 1974.

Marketing research workers usually work in modern, centrally located offices. Some, especially those employed by independent research firms, do a considerable amount of traveling in connection with their work. Also, they may frequently work under pressure and for long hours to meet deadlines.

Sources of Additional Information

Additional information on careers in marketing research is available from:

American Marketing Association, 222 South
Riverside Plaza, Chicago, Ill. 60606.

PERSONNEL AND LABOR RELATIONS WORKERS

(D.O.T. 166.088 through .268; 169.118)

Nature of the Work

Attracting the best employees available and matching them to the jobs they can do best is important for the success of any organization. Today, most businesses are much too large for close contact between owners and their employees. Instead, personnel and labor relations workers provide the link between management and employees—assisting management to make effective use of employees' skills, and helping employees to find satisfaction in their jobs and working conditions. Although some jobs require only limited contact with people outside the office, most jobs in this field involve frequent contact with other people. Dealing with people is an essential part of the job.

Personnel workers and labor relations workers concentrate on different aspects of employer-employee relations. Personnel workers interview, select, and recommend applicants to fill job openings. They handle wage and salary administration, training and career development, and employee benefits. "Labor relations" usually means union-management relations, and people who specialize in this field work for the most part in unionized establishments. They help company officials prepare for collective bargaining sessions, participate in contract negotiations with the union, and handle labor relations matters that come up everyday.

In a small company, personnel work consists mostly of interviewing and hiring, and one person usually can handle it all. By contrast, a large organization needs an entire staff, which might include recruiters, interviewers, counselors, job analysts, wage and salary analysts, education and training specialists, and labor relations specialists, as well as technical and clerical workers.

Personnel work often begins with the *personnel recruiter* or *employment interviewer* (D.O.T. 166.268), who works on a person-to-person basis with present and prospective employees. Recruiters travel around the country, often to college campuses, in the search for promising job applicants. Interviewers talk to applicants, and select and recommend those who appear qualified to fill vacancies. They often administer tests to applicants and interpret the results. Hiring and placement specialists need to be thoroughly familiar with the organization and its personnel policies, for they must be prepared to discuss wages, working conditions, and promotional opportunities with prospective and newly hired employees. They also need to keep informed about equal employment opportunity and affirmative action guidelines. Equal employment opportunity is a complex and sensitive area of personnel work which in some large organizations is handled by special EEO counselors or coordinators. The work of Employment Counselors, which is similar in a number of ways, is described in a separate statement elsewhere in this book.

Job analysts (D.O.T. 166.068) and *salary and wage administrators* (D.O.T. 169.118) do very exacting work. Job analysts collect and analyze detailed information on jobs, job qualifications, and worker characteristics in order to prepare job descriptions, sometimes called position classifications. Job descriptions tell applicants, interviewers, supervisors, and others basically what the duties of a job are and what training and skills it requires. Whenever a government agency or large business firm introduces a new job or evaluates existing ones, it calls upon the expert knowledge of the job analyst. Accurate information about job duties also is required when a firm evaluates its pay system and considers changes in wages and salaries. Establishing and maintaining pay systems is the principal job of wage administrators. They devise ways of making sure that pay rates within the firm are fair and equitable, and conduct surveys to see how their pay rates compare with those elsewhere.

Being sure that the firm's pay system complies with laws and regulations is another part of the job, one which requires knowledge of compensation structures and labor law.

Training specialists supervise or conduct training sessions, prepare manuals and other materials for these courses, and look into new methods of training. They also counsel employees on training opportunities, which may include on-the-job, apprentice, supervisory, or management training.

Employee-benefits supervisors and other personnel specialists handle the employer's benefits program, which often includes health insurance, life insurance, disability, and pension plans. These workers also coordinate a wide range of employee services, including cafeterias and snack bars, health rooms, recreational facilities, newsletters and communications, and counseling for work-related personal problems. Counseling employees who are approaching retirement age is a particularly important job of these workers.

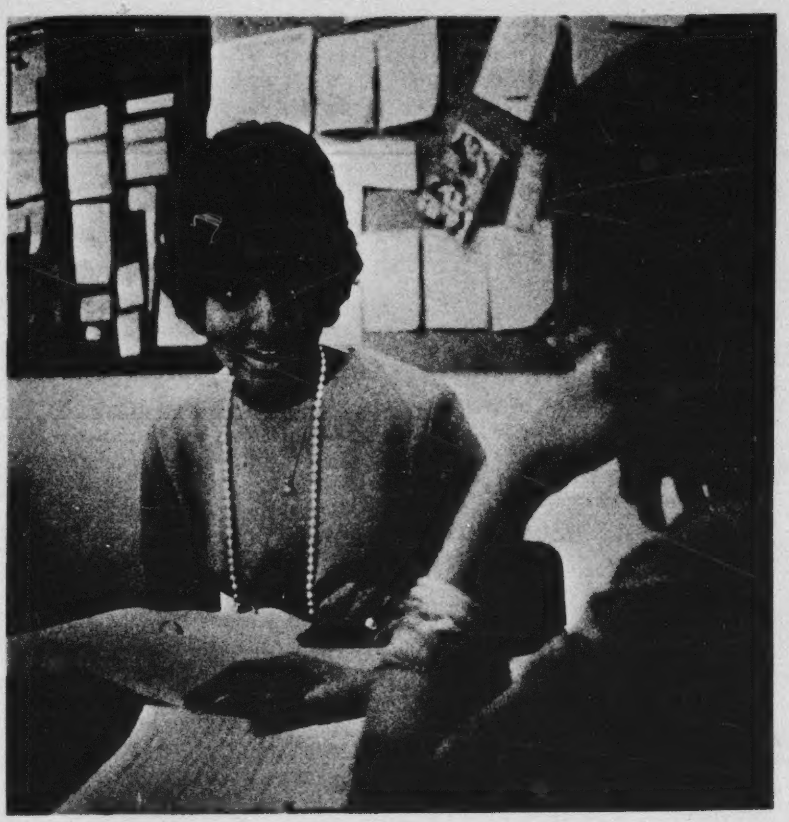
Occupational safety and health programs are handled in various ways. Quite often, in small companies especially, accident prevention and industrial safety are the responsibility of the personnel department—or of the labor relations specialist, if the union has a safety representative. Increasingly, however, there is a separate safety department under the direction of a safety and health professional, generally a safety engineer or industrial hygienist. (The work of Occupational Safety and Health Workers is discussed elsewhere in this book.)

Labor relations specialists (D.O.T. 169.118) advise management on all aspects of union-management relations. When the contract is up for negotiation, they provide background information and technical support, a job that requires extensive knowledge of economics, labor law, and collective bargaining trends. Actual negotiation of the agreement is conducted at the top level, with the director of labor relations or other top-ranking official serving as the employer's representative, but members of the company's labor relations staff play an important role throughout the negotiations.

Much of the everyday work of the labor relations staff concerns interpretation and administration of the contract, the grievance procedures in particular. Members of the labor relations staff would work with the union on seniority rights under the layoff procedure set forth in the contract, for example. Later in the day, they might meet with the union steward about a worker's grievance. Doing the job well means staying abreast of current developments in labor law, including arbitration decisions, and maintaining continuing liaison with union officials.

Personnel workers in government agencies generally do the same kind of work as those in large business firms. There are some differences, however. Public personnel workers deal with employees whose jobs are governed by civil service regulations. Civil service jobs are strictly classified as to duties, training, and pay. This requires a great deal of emphasis on job analysis and wage and salary classification; many people in public personnel work spend their time classifying and evaluating jobs, or devising, administering, and scoring competitive examinations given to job applicants.

Knowledge of rules and regulations pertaining to affirmative action and equal opportunity pro-



Job analyst reviews new job descriptions with a company official.

grams is important in public personnel work. In 1972, the U.S. Civil Service Commission established a specialization for Federal personnel workers concerned with promoting equal opportunity in hiring, training, and advancement. Similar attention to equal employment opportunity, accompanied by a need for qualified staff, is evident in State and local government agencies.

Labor relations is an increasingly important specialty in public personnel administration. Labor relations in this field have changed considerably in recent years, as union strength among government workers has grown. This has created a need for more and better trained workers to handle negotiations, grievances, and arbitration cases on behalf of Federal, State, and local government agencies.

Places of Employment

In 1974, over 320,000 people were personnel and labor relations workers. Three out of four worked in private industry, for manufacturers, banks, insurance companies, airlines, railroads, department stores, and other business concerns. Some worked for private employment agencies, including executive job-search agencies, "office temporaries" agencies, and others.

A large number of personnel and labor relations workers, over 80,000 in 1974, worked for Federal, State, and local government agencies. Most of these were in personnel administration, and handled recruitment, interviewing, testing, job classification, training, and other personnel matters for the Nation's 14.5 million public employees. Some were on the staff of the U.S. Employment Service and State employment agencies. Still others worked for agencies which oversee compliance with labor laws. Some, for example, were wage-hour compliance officers; their work is described in another part of this book, in the statement on Health and Regulatory Inspectors (Government). Other public employees in this field carried out research in economics, labor law, personnel practices, and related subjects, and sought new ways of ensuring that workers' rights under the law are understood and protected.

In comparison with private industry, labor unions do not employ a large number of professionally trained labor relations workers. An elected union official generally handles labor relations matters at the company level. At national and international union headquarters, however, the research and education staff usually includes specialists with degrees in industrial and labor relations, economics, or law.

A few personnel and labor relations workers are in business for themselves as management consultants or labor-management relations experts. In addition, some people in the field teach college or university courses in personnel administration, industrial relations, and related subjects.

Most jobs for personnel and labor relations workers are located in the highly industrialized sections of the country.

Training, Other Qualifications, and Advancement

Many employers seek to fill beginning positions in personnel and labor relations with college graduates who have the potential to move into management jobs. Some employers look for graduates who have majored in personnel administration or industrial and labor relations, while others prefer college graduates with a general business background. Still other employers feel that a well-rounded liberal arts education is the best preparation for personnel work. A college major in personnel administration, political science, or public administration can be an asset in looking for a job with a government agency.

At least 200 colleges and universities have programs leading to a degree in the field of personnel and labor relations. (While personnel administration is widely taught, the number of programs which focus primarily on labor relations is quite small.) In addition, many schools offer course work in closely related fields. An interdisciplinary background is appropriate for work in this area, and a combination of courses in the social sciences, behavioral sciences, business, and economics is useful.

Prospective personnel workers might include courses in personnel management, business administration, public administration, psychology, sociology, political science, economics, and statistics. Courses in labor law, collective bargaining, labor economics, labor history, and industrial psychology provide valuable backgound for the prospective labor relations worker.

Graduate study in industrial relations, economics, business, or law provides sound preparation for work in labor relations. While the law degree seldom is required for jobs at the entry level, most of the people with responsibility for contract negotiations are lawyers, and the industrial relations plus law degree combination is becoming highly desirable.

A college education is important, but it is not the only way to enter personnel work. Some people enter the field at the clerical level, and advance to professional positions on the basis of experience. They often find it helpful to take college courses part time, however.

New personnel workers usually enter formal or on-the-job training programs to learn how to classify jobs, interview applicants, or administer employee benefits. After the training period, new workers are assigned to specific areas in the company's employee relations department. After gaining experience, they usually can advance within their own company or transfer to another employer. At this point, some people move from personnel to labor relations work.

Some people enter the labor relations field directly, as trainees. They are usually graduates of master's degree programs in industrial relations, or may have a law degree. Quite a few people, however, begin in personnel work, gain experience in that area, and subsequently move into a labor relations job.

Workers in the middle ranks of a large organization often transfer to a top job in a smaller one. Employees with exceptional ability may be promoted to executive positions, such as director of personnel or director of labor relations.

Personnel and labor relations workers should speak and write effectively and be able to work with people of all levels of education and experience. They also must be able to see both the employee's and the employer's points of view. In addition, they should be able to work as part of a team. They need supervisory abilities and must be able to accept responsibility. Integrity and fairmindedness are important qualities for people in personnel and labor relations work. A persuasive, congenial personality can be a great asset.

Employment Outlook

The number of personnel and labor relations workers is expected to grow faster than the average for all occupations through 1985, as employers, increasingly aware of the benefits to be derived from good labor-management relations, continue to support sound, capably staffed employee relations programs. In addition to new jobs created by growth of the occupation, many openings will become available each year because of the need to replace workers who die, retire, or leave their jobs for other reasons.

Recent legislation setting standards for employment practices in the areas of occupational safety and health, equal employment opportunity, and pensions has stimulated demand for personnel and labor relations workers. Continued growth is foreseen, as employers throughout the country review existing programs in each of these areas and, in many cases, establish entirely new ones. This has created job opportunities for people with appropriate expertise. The effort to end discriminatory employment practices, for example, has led to scrutiny of the testing, selection, placement, and promotion procedures in many companies and government agencies. The findings are causing a number of employers to modify these procedures, and to take steps to raise the level of professionalism in their personnel departments.

Substantial employment growth is foreseen in the area of public personnel administration. Opportunities probably will be best in State and local government, areas which are expected to experience strong employment growth over the next decade. By contrast, Federal employment will grow slowly. Moreover, as union strength among public employees continues to grow, State and local agencies will need many more workers qualified to deal with labor relations. Enactment of collective bargaining legislation for State and local government employees could greatly stimulate demand for labor relations workers knowlegeable about public sector negotiations.

Although the number of jobs in both personnel and labor relations is projected to increase over the next decade, competition for these jobs also is increasing. Particularly keen competition is anticipated for jobs in labor relations. A small field, labor relations traditionally has been difficult to break into, and opportunities are best for applicants with a master's degree or a strong undergraduate major in industrial relations, economics, or business. A law degree is an asset.

Earnings and Working Conditions

Beginning job analysts in private industry started at $9,800 a year in 1974, according to a Bureau of Labor Statistics survey. Experienced job analysts earned $17,300 a year, about twice the average for all nonsupervisory workers in private industry, except farming. Directors of personnel earned between $15,600 and $27,300 a year; top labor relations executives in large corporations earned considerably more.

Beginning job analysts employed by State governments had starting salaries ranging from $8,000 to $10,000 in 1974, according to a survey of public service pay conducted by the International Personnel Management Association. In the Federal Government, new graduates with a bachelor's degree generally started at $8,500 a year in late 1974. Those with a master's degree started at about $10,500 a year, or in some cases, at $12,800 a year.

Average salaries of Federal employees in several different areas of personnel work ranged from about $19,000 to $22,500 in late 1974, as follows:

Staffing specialists	$19,100
Position classifiers	20,300
Personnel management specialists	21,500
Employee development specialists	21,500
Salary and wage administrators	22,500

Federal employees in the field of labor relations had generally comparable salaries. Labor-management and employee relations specialists and labor-management relations officers averaged $21,500 a year in late 1974. Federal mediators' salaries were higher: about $30,000 a year, on the average.

Employees in personnel offices generally work 35 to 40 hours a week. As a rule, they are paid for holidays and vacations, and share in retirement plans, life and health insurance plans, and other benefits available to all professional workers in their organizations.

Sources of Additional Information

For general information on careers in personnel and labor relations work, write to:

American Society for Personnel Administration, 19 Church St., Berea, Ohio 44017.

Information about careers in public personnel administration is available from:

International Personnel Management Association, 1313 E. 60th St., Chicago, Ill. 60637.

A brochure describing a career in labor-management relations as a field examiner is available from:

Director of Personnel, National Labor Relations Board, 1717 Pennsylvania Ave. NW., Washington, D.C., 20570.

PUBLIC RELATIONS WORKERS

(D.O.T. 165.068)

Nature of the Work

How successfully an organization presents itself may affect its public acceptance and influence. Public relations workers help organizations build and maintain positive public images. Public relations is more than telling the employer's "story," however. Understanding the attitudes and concerns of customers, employees, and various other "publics"—and communicating this information to management—is an important part of the job.

Public relations departments are found in many different organizations, and workers must tailor their programs to an employer's particular needs. A public relations director for a college or university, for example, may devote most of his or her energies to attracting additional students, while one in a large corporation may handle the employer's relations with stockholders, government agencies, and community groups.

Public relations workers put together information that keeps the public aware of their employer's activities and accomplishments. After preparing the information, they contact people in the media who might be interested in publicizing their material. Many television commercials or special reports, newspaper items, and magazine articles start at public relations workers' desks. Sometimes the subject is a company and its policies towards its employees or its role in the community. Often the subject is a public issue, such as health, nutrition, energy, or the environment.

Public relations workers also arrange and conduct programs in which company representatives will have direct contact with the public. Such work includes setting up speaking engagements for company officials and writing speeches for them. These workers often serve as an employer's representative during community projects and occasionally show films at school assemblies, plan conventions, or manage fund-raising campaigns.

Public relations staffs in very large firms may number 200 or more, but in most firms the staff is much smaller. The director of public relations may develop

Public relations worker reviews copy for new stockholders report with company officials.

overall plans and policies with a top management executive having the authority to make final decisions. In addition, large public relations departments employ writers, research workers, and other specialists who prepare material for the different media or write reports sent to stockholders.

Workers who handle publicity for an individual or direct public relations for a university or small business may handle all aspects of the job. They make contacts with people outside the organization, do the necessary planning and research, and prepare material for publication. These workers may combine public relations duties with advertising or sales promotion work; some are top-level officials and others have lower level positions. The most skilled public relations work of making overall plans and maintaining contacts usually is done by the department director and highly experienced staff members.

Places of Employment

More than 100,000 persons—about 30 percent of them women—were public relations workers in 1974. Manufacturing firms, public utilities and transportation companies, insurance companies, and trade and professional associations employ the majority of public relations workers. However, a sizeable number work for government agencies, or for schools, colleges, museums, and many other kinds of educational, religious, and welfare organizations. The rapidly expanding health field also offers opportunities for public relations work, in hospitals, pharmaceutical companies, and medical associations, for example. A number of public relations workers are employed by consulting firms, which furnish public relations services to clients for a fee.

Public relations workers are concentrated in large cities where press services and other communications facilities are readily available, and where many businesses and trade associations have their headquarters. More than half of the estimated 1,700 public relations consulting firms in the United States are in New York, Los Angeles, Chicago, and Washington, D.C.

Training, Other Qualifications, and Advancement

A college education combined with journalism experience is an excellent preparation for public relations work. Although most beginners have a college degree in journalism, English, or public relations, some employers prefer a background in a field related to the firm's business—science or engineering, for example. Some firms want college graduates with at least 1 year's experience working for the news media.

In 1974, over 80 colleges and more than 30 graduate schools offered degree programs or special curriculums in public relations. In addition, nearly 200 colleges offered at least one course in this field.

Courses in journalism, business administration, psychology, and public speaking help in preparing for a public relations career. Extracurricular activities such as writing for a school publication provide valuable experience. Part-time or summer jobs in public relations provide training that can help in competing for entry positions.

Creativity, initiative, and the ability to express thoughts clearly and simply are important to the public relations worker. Fresh ideas are so vital in public relations that some experts spend all their time developing new ideas, leaving the job of carrying out programs to others.

People who choose public relations work as a career need an outgoing personality, self-confidence, and an understanding of human psychology. They should have the enthusiasm necessary to motivate people. Public relations workers need a highly developed sense of competitiveness and the ability to function as part of a team.

Some companies—particularly those with large public relations staffs—have formal training programs for new workers. In other firms, new employees learn by working under the guidance of experienced staff members. Beginners often maintain files of material about company activities, scan newspapers and magazines for appropriate articles to clip, and assemble information for speeches and pamphlets. After gaining experience, they work on more difficult assignments, such as writing press releases, speeches, and articles for publication.

Promotion to supervisory jobs may come as workers show they can handle more demanding and creative assignments. Some experienced public relations workers start their own consulting firms.

Employment Outlook

Employment of public relations workers is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to new jobs created by this growth, openings will occur every year because of the need to replace workers who leave the field.

Demand for public relations workers may be affected by economic conditions, slackening as employers delay expansion or impose staff cuts during business slowdowns. Over the long run, however, public relations spending is expected to increase substantially. Corporations, associations, and other large organizations are likely to expand their public relations efforts to gain public support and approval.

Competition for beginning jobs is keen, for public relations work has an aura of glamour and excitement which attracts large numbers of jobseekers. Prospects for a career in public relations are best for enthusiastic people with sound academic preparation and some media experience.

Earnings and Working Conditions

Starting salaries for college graduates beginning in public relations work ranged from $7,500 to $9,000 a year in 1974, according to the limited data available.

The salaries of experienced workers generally are highest in large organizations with extensive public relations programs. Directors of public relations for medium-sized firms earned $15,000 to $30,000 a year; those at large companies had salaries in the $20,000 to $50,000 range. Salaries for some officials, such as vice-presidents in charge of public relations, can range from $25,000 to $75,000 a year or more.

The median salary for directors of public relations was about $23,000 in 1974. Public relations consulting firms often pay higher salaries than organizations with their own public relations departments. In social welfare agencies, nonprofit organizations, hospitals, and universities, salaries generally are lower.

Although the workweek for public relations staffs usually is 35 to 40 hours, overtime may be necessary to prepare or deliver speeches, attend meetings and community activities, or travel out of town. Occasionally, the nature of their regular assignments or special events requires public relations workers to be on call around the clock.

Sources of Additional Information

For career information and a list of schools offering degrees and courses in the field, write:

Career Information, Public Relations Society of America, Inc., 845 Third Ave., New York, N.Y. 10022.

Salary data and other statistics are available from:

PR Reporter, Meriden, N.H. 03770.

PURCHASING AGENTS

(D.O.T. 162.158, 180.118,
191.118, and 252.358)

Nature of the Work

If materials, supplies, or equipment are not on hand when needed, an organization's work may be interrupted or halted. Maintaining an adequate supply of items a firm needs to operate is the purchasing agent's job.

Purchasing agents, also called industrial buyers, and their assistants obtain goods and services of the required quality at the lowest possible cost, and see that adequate supplies are kept on hand. Agents who work for manufacturing firms buy machinery, raw materials, and product components; those working for government agencies may purchase office supplies, furniture, and business machines. Information on retail buyers, who purchase merchandise for resale in its original form, is presented in the statement on Buyers elsewhere in this book.

Purchasing agents buy when stocks on hand reach a predetermined reorder point, or when a department in the organization requisitions items it needs. Because agents often can purchase from many sources, their main job is selecting the seller who offers the best value.

Purchasing agents use a variety of means to select among suppliers. They compare listings in catalogs and trade journals and telephone suppliers to get information. They also meet with salespersons to examine samples, watch demonstrations of equipment, and discuss items to be purchased. Sometimes agents invite suppliers to bid on large orders; then they select the lowest bidder among those who meet requirements for quality of goods and delivery date.

In some cases, however, purchasing agents must deal directly with a manufacturer to obtain specially designed items made exclusively for their company. These agents must have a high degree of technical expertise to insure that all product specifications are met.

It is important that purchasing agents develop good business relations with their suppliers. This can result in savings on purchases, favorable terms of payment, and quick delivery on rush orders or materials in short supply. They also work closely with personnel in various departments of their own organization. For example, they may discuss product design with company engineers or shipment problems with workers in the shipping and receiving or traffic departments.

Once an order has been placed with a supplier, the purchasing agent makes periodic checks to insure that it will be delivered on time. This is necessary to prevent work flow interruptions due to lack of materials. After an order has been received and inspected, the purchasing agent authorizes payment to the shipper.

Because of its importance, purchasing usually is designated as a separate responsibility within a firm. In a large firm, the purchasing manager directs the work of a staff which includes purchasing agents, purchasing assistants, and clerical workers. In such a firm, purchasing agents usually are responsible for buying one or more specific items—for example, steel, lumber, cotton, or petroleum products. In smaller firms, agents generally are assigned certain categories of goods, such as all raw materials or all office supplies, furniture, and business machines.

Purchasing agent discusses an order with a sales representative.

Places of Employment

Nearly 190,000 persons—18 percent of them women—worked as purchasing agents in 1974. Over half worked in manufacturing industries. Large numbers also were employed by government agencies, construction companies, hospitals, and schools. Since the early 1960's, employment of women purchasing agents has increased much faster than that of men. Particularly impressive employment gains have been made by women with college degrees, and every indication points toward continuing job opportunities for women.

About half of all purchasing agents work in organizations that have fewer than five employees in the purchasing department. Many business firms and government agencies, however, have much larger purchasing departments; some employ as many as 100 specialized buyers or more.

Training, Other Qualifications, and Advancement

Most large employers seek college graduates for entry positions as assistant purchasing agents. A growing number of large companies look for applicants who have done graduate work in purchasing management or related fields. Although companies that manufacture complex machinery or chemicals may prefer a background in engineering or science, other companies hire business administration or liberal arts majors for trainee jobs. Courses in accounting, economics, and purchasing are helpful. Familiarity with the computer and its uses also is desirable. Some small firms prefer experience with the company, and select purchasing workers from among their own personnel, whether or not they have a college education. For advancement to management positions, however, a college degree is becoming increasingly important.

Regardless of previous training, beginning purchasing assistants must spend considerable time learning about their company's operations and purchasing procedures. They may be assigned to the storekeeper's section to learn about purchasing forms, inventory records, and storage facilities. Next they may work with experienced buyers to learn about types of goods purchased, prices, and suppliers.

Following the initial training period, assistant purchasing agents are given responsibility for purchasing standard catalog items. As they gain experience and demonstrate good judgment in performing various purchasing tasks, they may be promoted to purchasing agent. Purchasing agents with proven ability can move into a job as manager of a purchasing department; some advance to executive positions as corporate director of purchasing and material management.

The purchasing agent must be able to analyze numbers and technical data in order to make buying decisions and take responsibility for spending large amounts of company money. The job requires the ability to work independently and a good memory for details. In addition, a purchasing agent must be tactful in dealing with salespersons and able to motivate others.

Employment Outlook

Employment of purchasing agents is expected to increase much faster than the average for all occupations through the mid-1980's. Several thousand jobs will be open every year due to growth of the occupation and the need to replace those who die, retire, or transfer to other work.

Growth in demand for industrial machinery, including engines and turbines, electronic computer equipment, and communications equipment, will increase employment opportunities. For example, purchasing agents will be needed to develop reliable new sources of supply for materials which are in short supply. In addition, the growing specialization of manufacturing processes will spur demand for purchasing agents with a technical background and those who have completed graduate level courses in purchasing management.

Many opportunities also should occur in firms providing personal, business, and professional services. Strong growth is expected for this sector of the economy, and a growing number of employers are recognizing the importance of professional purchasers in relatively small firms.

Earnings and Working Conditions

College graduates hired as assistant purchasing agents in large firms earned about $8,500 a year in 1974, according to the limited data available.

Experienced agents purchasing standard items averaged about $10,000 a year; buyers purchasing complex or technical goods averaged between $12,100 and $14,700. Those responsible for the purchase of highly complex and specialized items earned about $17,400 in 1974. Managers of purchasing departments earned substantially more and many top purchasing executives earned over $50,000 a year. Salaries generally are lower in small companies. In 1974, earnings of purchasing agents were about one and one-half times as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, beginning purchasing agents who had college degrees earned $8,500 or $10,500 in late 1974, depending on scholastic achievement and relevant work experience. The average salary for all purchasing agents in the Federal Service was $18,600. Salary levels vary widely among State governments; however, average earnings range from $9,000 to $11,700 for purchasers of standard items, $11,900 to $15,600 for senior buyers purchasing highly complex items, and $18,000 to $21,900 for State purchasing directors.

Sources of Additional Information

Further information about a career in purchasing is available from:

National Association of Purchasing Management, 11 Park Place, New York, N.Y. 10007.

National Institute of Governmental Purchasing, 1001 Connecticut Ave. NW., Washington, D.C. 20036.

URBAN PLANNERS

(D.O.T. 199.168)

Nature of the Work

Urban planners, often called community or regional planners, develop programs to provide for future growth and revitalization of urban, suburban and rural communities. They help local officials make decisions to solve social, economic and environmental problems.

Planners examine community facilities such as health clinics and schools to be sure these facilities can meet the demands placed upon them. They also keep abreast of the legal issues involved in community development or redevelopment and any changes in housing and building codes. Because suburban growth has increased the need for better ways of traveling to the urban center, the planner's job often includes designing new transportation and parking facilities.

Urban planners prepare for situations or needs that are likely to develop as a result of population growth or social and economic change. They estimate, for example, the community's long-range needs for housing, transportation, and business and industrial sites. Working within a framework set by the community government, they analyze and propose alternative ways to achieve more efficient and attractive urban areas.

Before preparing plans for long-range community development, urban planners prepare detailed studies that show the current use of land for residential, business, and community purposes. These reports present information such as the arrangement of streets, highways, and water and sewer lines, and the location of schools, libraries, and playgrounds. They also provide information on the types of industries in the community, characteristics of the population, and employment and economic trends. With this information, urban planners propose ways of using undeveloped land and design the layout of recommended buildings and other facilities such as subways. They also prepare materials that show how their programs can be carried out and the approximate costs.

Urban planners often confer with private land developers, civic leaders, and officials of public agencies that do specialized planning. They may prepare materials for community relations programs, speak at civic meetings, and appear before legislative committees to explain and defend their proposals.

In small organizations, urban planners must be able to do several kinds of work. In large organizations, planners usually specialize in areas such as physical design, community relations, or the reconstruction of run-down business districts.

Places of Employment

About 13,000 persons—about 10 percent of them women—were urban planners in 1974. Most work for city, county, or regional planning agencies. A growing number are employed by States or by the Federal Government in agencies dealing with housing, transportation, or environmental protection.

Many planners do consulting work, either part time in addition to a regular job, or full time working for a firm that provides services to private developers or government agencies. Urban planners also work for large land developers or research organizations and teach in colleges and universities.

Training, Other Qualifications, and Advancement

Employers often seek workers who have advanced training in urban planning. Two years of graduate study in city planning, or the equivalent in work experience, are required for most entry jobs in Federal, State, and local government agencies. Although the master's degree in planning is the usual requirement at the entry level, some people who have a bachelor's degree in city planning, architecture, landscape architecture, or engineering may qualify for beginning positions.

In 1974, over 60 colleges and universities gave a master's degree in urban planning. Although students holding a bachelor's degree in architecture or engineering may earn a master's degree after 1 year, most graduate programs in urban planning require 2 or 3 years to complete. Graduate students spend considerable time in workshops or laboratory courses learning to analyze and solve urban planning problems. Students often are required to work in a planning office part time or during the summer while they are earning the graduate degree.

Candidates for jobs in Federal, State, and local government agencies usually must pass civil service examinations to become eligible for appointment.

Planners must be able to think in terms of spatial relationships and to visualize the effects of their plans and designs. They should be flexible in their approaches to problems and be able to cooperate with others and reconcile different viewpoints to achieve constructive policy recommendations.

After a few years' experience, urban planners may advance to assignments requiring a high degree of independent judgment, such as outlining proposed studies, designing the physical layout of a large development, or recommending policy, program, and budget options. Some are promoted to jobs as planning directors, and spend a great deal of time meeting with officials in other organizations, speaking to civic groups, and supervising other professionals. Further advancement is more difficult at this level and often occurs through a transfer to a large city, where the problems are more complex and the responsibilities greater.

Employment Outlook

Employment of urban planners is expected to grow faster than the average for other occupations through the mid-1980's. In addition to opportunities created by future growth of this relatively small occupation, some jobs will open up because of the need to replace planners who leave their jobs.

The number of persons enrolled in graduate planning programs has risen rapidly in recent years. If this trend continues, the number of applicants may begin to outstrip available openings, leading to increased competition for jobs in this field. However, well qualified applicants should continue to find good employment prospects.

Future growth of the occupation will depend on the availability of money for the development of new communities and the restoration of older urban areas. Funding for these projects can be affected by shortages of mortgage money and higher costs for land, building materials, and necessary community services such as education and police and fire protection. Further, government programs to aid the development of community planning are subject to frequent review. Future levels of Federal spending will greatly influence the growth of urban planning projects.

Over the long run, however, the Nation's need for good quality housing, transportation systems, health care, and other social services is expected to spur the demand for additional urban planners.

Earnings and Working Conditions

Starting salaries for urban planners were about $11,000 a year in 1974. Planners with a master's degree were hired by the Federal Government at $12,841 a year in late 1974. In some cases, persons having less than 2 years of graduate work could enter Federal service as interns at yearly salaries of either $8,500 or $10,520.

The salaries of directors of planning depend largely on the size of the city where they work. In 1974, for example, the median earnings of planning directors in the Nation's largest cities were well over $30,000 a year. In smaller towns, earnings may be less than half as large. Consultants earn fees that vary according to their reputation and previous experience.

Most planners have sick leave and vacation benefits and are covered by retirement and health plans. Although most city planners have a scheduled workweek of 40 hours, they sometimes work in the evenings and on weekends to attend meetings with citizens' groups.

Sources of Additional Information

Facts about careers in planning and a list of schools offering training are available from:

American Institute of Planners, 1776 Massachusetts Ave. NW., Washington, D.C. 20036.

American Society of Planning Officials, 1313 East 60th St., Chicago, Ill. 60637.

COMPUTER AND RELATED OCCUPATIONS

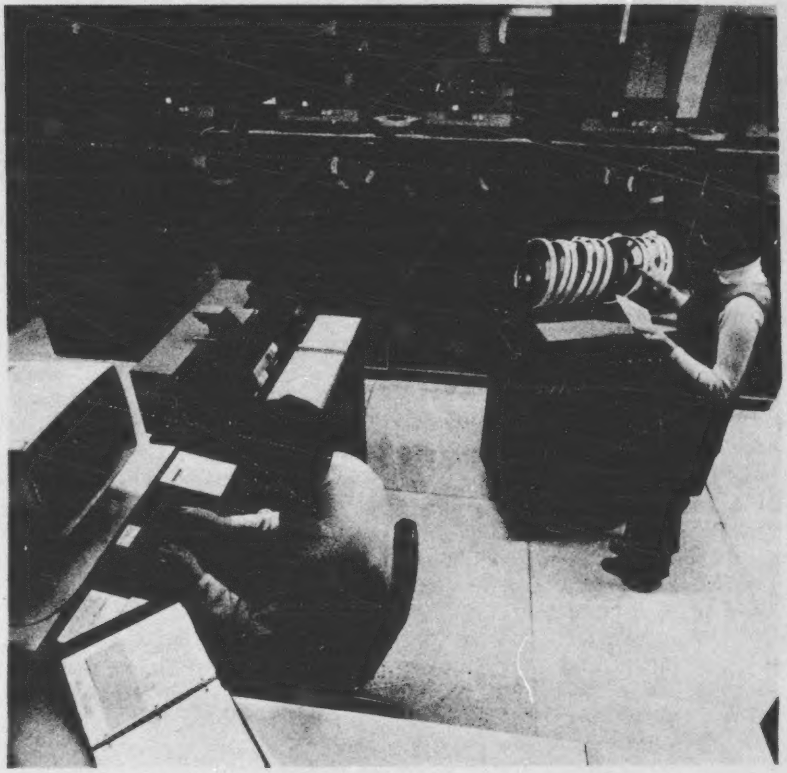
Since 1951, when the first computer was installed for commercial use, computer systems have become an increasingly important part of everyday life. Today these machines bill customers, pay employees, record airline and hotel reservations, and monitor factory production processes. Scientific and engineering research relies on computer systems to solve complex equations as well as to collect, store, and sort vast amounts of data.

Workers in computer and related occupations design data processing systems, write instructions and translate data into machine-readable language, and operate computers and peripheral equipment.

Most computer careers require some type of specialized training. Although not a universal requirement, a college degree is increasingly important for systems analysts and programmers—especially for those who work in scientific and technical research operations. For all computer occupations, employers stress the importance of learning on the job.

In addition to technical knowledge and skills, computer personnel must be able to concentrate on their work and should enjoy working with details. Programmers and systems analysts must be abe to think logically and enjoy solving problems.

This section describes two computer occupations: Programmers and Systems Analysts.



Programmers sometimes use a terminal to enter data and instructions directly into the computer.

PROGRAMMERS

(D.O.T. 020.188)

Nature of the Work

Computers can process masses of information rapidly and accurately, but only if they are given step-by-step instructions to follow. Because the machines cannot think for themselves, computer programmers must write detailed instructions called programs that list in a logical order the steps the machine must follow to solve a problem.

When a new problem is to be given to a computer, an experienced programmer first carefully examines the problem and determines the steps necessary to reach a solution. Programmers whose work includes a considerable amount of this preliminary analysis are sometimes called program analysts. Once this part of the job is finished, an applications programmer writes detailed instructions for processing the data, using one of the languages developed especially for computers.

Programs vary with the type of problem to be solved because the mathematical calculations involved in payroll accounting procedures, for example, are different from those required to determine the flight path of a space probe. A business applications programmer developing instructions for billing customers would first decide what company records the computer would need and then draw a flow chart or diagram showing the steps the computer must follow to obtain old balances, add new charges, calculate finance charges, and deduct payments before determining a customer's bill. Using the flow chart, the programmer writes the actual instructions the computer will follow.

The programmer then checks the operation of the program to be sure the instructions are correct and will produce the desired information. This check is called "debugging." The programmer tries a sample of the data with the program and reviews the results to see if any errors are made. If errors occur, the program must be changed and rechecked until it produces the correct results.

Finally, an instruction sheet is prepared for the computer operator who will run the program.

Although simple programs can be written in a few days, programs which use complex mathematical formulas or many data files may require more than a year of work. In such cases, several programmers often work together under an experienced programmer's supervision.

Programmers usually specialize in either business or scientific operations because they require different types of educational backgrounds. Some programmers who have had training in systems analysis specialize in writing instructions for an entire operating system and are called systems programmers. These workers write programs that tell the computer how to schedule the jobs it has been given and when to switch from one to another. They also develop new computer languages.

Places of Employment

In 1974, about 200,000 persons—about three-fourths of them men—worked as computer programmers. Most were employed by manufacturing firms, banks and financial institutions, data processing service organizations, and government agencies.

Programmers usually work in large firms that need and can afford extensive computer systems. Small firms generally require computers only for payroll or billing purposes and frequently pay data processing service organizations to do this work. Systems programmers usually work in research organizations and computer manufacturing firms.

Training, Other Qualifications, and Advancement

There are no universal training requirements for progammers because employers' needs vary. Some programmers are college graduates; others have taken special courses in computer work to supplement their experience in fields such as accounting or inventory control.

Employers using computers for scientific or engineering applications prefer college graduates with degrees in the physical sciences, mathematics, engineering, or computer science. Graduate degrees are required for some jobs. Very few scientific organizations are interested in applicants with no college training.

Although many employers who use computers for business applications do not require college degrees, they prefer applicants who have had college courses in data processing, accounting, and business administration. Occasionally, workers who are experienced in machine tabulation or payroll accounting but have no college training are promoted to programming jobs; however, they need additional data processing courses to become fully qualified programmers.

Computer programming is taught at a growing number of technical schools, colleges, and universities. Instruction ranges from introductory home study courses to advanced courses at the graduate level. High schools in many parts of the country also offer courses in computer programming.

In hiring programmers, employers look for people who can think logically and are capable of exacting analytical work. The job also calls for patience, persistence, and the ability to work with extreme accuracy even under pressure. Ingenuity and imagination are particularly important when programmers must find new ways to solve a problem.

Beginning programmers usually spend their first weeks on the job attending training classes. After this initial instruction, they work on simple assignments while completing further specialized training programs. Programmers generally must spend at least a year working under close supervision before they can handle all aspects of their job. Once skills have been acquired, however, the prospects for further advancement are good. In large organizations, they may be promoted to lead programmers or systems analysts and have supervisory responsibilities.

Employment Outlook

Employment of programmers is expected to grow faster than the average for all occupations through the mid-1980's as computer usage expands, particularly in medical, educational, and data processing services. In addition to job openings resulting from growth of the occupation, several thousand openings will arise each year from the need to replace workers who leave the occupation. Because many programmers are relatively young, few openings will result from deaths or retirements.

The demand for applications programmers will increase as many processes once done by hand are automated, but employment will not grow as rapidly as in the past for several reasons. Improved programming languages that can be used by other than data processing personnel will simplify or eliminate some programming tasks. Also, many programs for business operations have been standardized and are sold to computer users by computer manufacturers and "software" companies that specialize in writing programs. Job opportunities will be best for systems programmers and applications programmers who have had some training in systems analysis.

Earnings and Working Conditions

Average weekly earnings of beginning programmers in private industry ranged from $170 to $240 in 1974, according to surveys conducted in urban areas by the Bureau of Labor Statistics and firms engaged in research on data processing occupations. Experienced workers earned from $260 to $335 weekly, and lead programmers earned from $295 to $360. Earnings of applications programmers are generally at the lower end of the scale, systems programmers at the higher end.

Salaries in the Federal Government are comparable to those in private industry. Programmers working in the North and West earned somewhat more than those working in the South. Those working for data processing services and manufacturing firms had higher earnings than programmers employed in banks, advertising, or educational institutions. Overall, programmers earned about twice as much as the average for all nonsupervisory workers in private industry, except farming.

Programmers work about 40 hours a week, but their hours are not always from 9 to 5. Once or twice a week a programmer may report early or work late to use the computer when it is available. Occasionally, they work on weekends or are telephoned to advise computer operators working a second or third shift.

Sources of Additional Information

Additional information about the occupation of programmer is available from:

American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

SYSTEMS ANALYSTS

(D.O.T. 003.187, 012.168, 020.081 and 020.088)

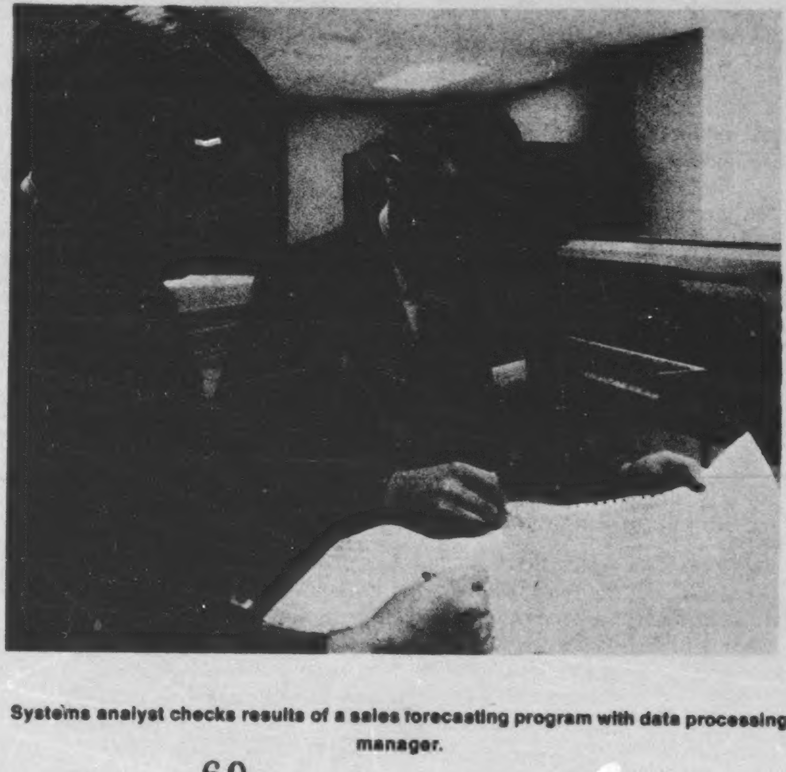
Nature of the Work

Many essential business functions and scientific research projects depend on systems analysts to plan efficient methods of processing data and handling the results. Analysts begin an assignment by discussing the data processing problem with managers or specialists in the area concerned. If a new inventory system is desired, for example, analysts must determine what new data need to be collected, the equipment needed for processing, and the procedure to be followed in using the information.

Analysts use various techniques, such as cost accounting, sampling, and mathematical model building to analyze the problem and devise a new system. Once a system has been developed, they prepare charts and diagrams that describe its operation in terms that managers or customers can understand.

If the system is accepted, analysts prepare instructions for programmers and test the operation of the system.

The problems systems analysts must solve range from monitoring



Systems analyst checks results of a sales forecasting program with data processing manager.

nuclear fission in a powerplant to forecasting sales for an appliance manufacturing firm. Because the work is so varied and complex, most analysts specialize in either business or scientific and engineering applications.

Some analysts improve systems already in use by developing better procedures or adapting the system to handle additional types of data. Others do research, called advanced systems design, to devise new methods of systems analysis.

Places of Employment

About 115,000 persons—10 percent of them women—worked as systems analysts in 1974. Most worked in urban areas for manufacturing firms, wholesale and retail businesses, and data processing service organizations. In addition, large numbers worked for banks, insurance companies, and educational institutions.

Training, Other Qualifications, and Advancement

There is no universally acceptable way of preparing for a job as a systems analyst because employers' preferences depend on the work being done. Employers usually want analysts with backgrounds in accounting, business, or economics for work in finance, while persons with backgrounds in the physical sciences, mathematics, computer science, or engineering are preferred for work in scientifically oriented organizations. Some employers prefer applicants who have a bachelor's degree and work experience in one of these fields. Others stress a graduate degree. Applicants also may qualify on the basis of professional experience as a programmer or computer operator.

Most employers prefer people who have had some experience in computer programming. Beginning analysts without this experience can learn to use electronic data processing equipment on the job, or can take special courses offered by their employers, computer manufacturers, or colleges. In the Federal Government and many industries, systems analysts begin their careers as programmers and are promoted to analyst trainees after gaining some experience and acquiring additional training. Later they are promoted to systems analysts.

Systems analysts must be able to think logically and should like working with ideas. Although most systems analysts work independently, they sometimes work in teams on large projects. The ability to concentrate and pay close attention to details also is important.

In large data processing departments, persons who begin as junior systems analysts may be promoted to senior or lead systems analysts after several years of experience. Systems analysts who show leadership ability also can advance to jobs as managers of systems analysis or data processing departments.

Employment Outlook

Employment of systems analysts is expected to grow faster than the average for all occupations through the mid-1980's as computer usage expands, particularly in medical, educational, and data processing services. In addition to opportunities that will result from growth, some openings will occur as systems analysts advance to managerial positions or enter other occupations. Because many of these workers are relatively young, few positions will result from retirement or death.

The demand for systems analysts is expected to increase as users become more familiar with computer capabilities and expect greater efficiency and performance from their data processing systems. Advances in hardware and computer programs will result in expanded computer applications in manufacturing and small businesses, and this, too, will contribute to employment growth.

Earnings and Working Conditions

Average weekly earnings for beginning systems analysts in private industry ranged from $230 to $250 in 1974, according to surveys conducted in urban areas by the Bureau of Labor Statistics and private firms engaged in research on computer occupations. Experienced workers earned from $300 to $335, and lead systems analysts earned from $335 to $360 weekly. Earnings in the Federal Government were comparable to those in private industry.

Systems analysts working in the North and West earned somewhat more than those in the South and generally their earnings were greater in data processing or manufacturing firms than in banks or educational institutions. Overall, systems analysts earn more than twice as much as the average for all nonsupervisory workers in private industry, except farming.

Systems analysts usually work about 40 hours a week—the same as other professional and office workers. Unlike many computer operators, systems analysts are not assigned to evening or night shifts. Occasionally, however, evening or weekend work may be necessary to complete emergency projects.

Sources of Additional Information

Further information about the occupation of systems analyst is available from:

American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

INSURANCE OCCUPATIONS

Insurance protection is an integral part of the American way of life. It frees policyholders and their beneficiaries from worry and financial burdens that may result from death, illness, or other losses beyond their control. Businesses could not operate, nor could most people buy homes or other major items, without the assurance of protection from sudden disaster. Insurance workers adapt policies to meet changing needs, decide which applications can be accepted and establish premium rates on the policies, and investigate and settle claims.

A college degree is increasingly important for professional, technical, and managerial jobs in insurance, although some positions are open to high school graduates who have appropriate experience. Regardless of their previous training, insurance workers must continually learn while on the job. Many professional associations sponsor courses in all phases of insurance work; employees are encouraged to participate to prepare themselves for more responsible jobs.

This section describes three insurance occupations: Actuaries, Claim Representatives, and Underwriters.

ACTUARIES

(D.O.T. 020.188)

Nature of the Work

Why do young persons pay more for automobile insurance than older persons? How much should an insurance policy cost? Answers to these and similar questions are provided by actuaries who design insurance and pension plans that can be maintained on a sound financial basis. They assemble and analyze statistics to calculate probabilities of death, sickness, injury, disability, unemployment, retirement, and property loss from accident, theft, fire, and other potential hazards. Actuaries use this information to determine the expected insured loss. For example, they may calculate how many persons who are 21 years old today can be expected to live to age 65—the probability that an insured person might die during this period is a risk to the company. They then calculate a price for assuming this risk that will be profitable to the company yet be competitive with other insurance companies. Finally, they must make sure that the price charged for the insurance will enable the company to pay all claims and expenses as they occur. In the same manner, the actuary calculates premium rates and policy contract provisions for each type of insurance offered. Most actuaries specialize in either life and health insurance or in property and liability (casualty) insurance.

To perform their duties effectively, actuaries must keep informed about general economic and social trends, and legislative, health, and other developments that may affect insurance practices. Because of their broad knowledge of insurance, actuaries may work on problems arising in the company's investment, group underwriting, or pension planning departments. Actuaries in executive positions help determine general company policy. In that role, they may be called upon to explain complex technical matters to company executives, government officials, and the public. They may testify before public agencies on proposed legislation affecting the insurance business, for example, or explain intended changes in premium rates or contract provisions.

Actuaries who work for the Federal Government usually deal with a particular insurance or pension program, such as social security or life insurance for veterans and members of the Armed Forces. Actuaries in State government positions regulate insurance companies, supervise the operations of State retirement or pension systems, and work on problems connected with unemployment insurance or workers' compensation. Consulting actuaries set up pension and welfare plans and make periodic evaluations of these plans for private companies, unions, and government agencies.

Places of Employment

Approximately 10,700 persons worked as actuaries in 1974. Four of every 10 actuaries worked in five major cities—New York, Hartford, Chicago, Philadelphia, and Boston.

About two-thirds of all actuaries worked for private insurance companies. Almost 90 percent of them worked for life insurance companies; the rest worked for property and liability (casualty) companies. The number of actuaries employed by an insurance company depends on the volume of its business and the number and types of insurance policies it offers. Large companies may employ over 100 actuaries on their staffs or rely instead on rating bureaus or consulting firms.

Consulting firms and rating bureaus (associations that supply actuarial data to member companies) employed about one-fifth of all actuaries. Other actuaries work for private organizations administering independent pension and welfare plans or for Federal and State government agencies. A few teach in colleges and universities.

Training, Other Qualifications, and Advancement

The minimum requirement for beginning jobs in large life or casualty companies is a bachelor's degree with a major in mathematics or statistics. Some companies will hire applicants with a major in economics or business administration who demonstrate a thorough foundation in calculus, probability, and statistics (20-25 hours). Other desirable courses are insurance law, economics, and accounting. Although only 17 colleges and universities offer training specifically designed for actuarial careers, several hundred schools offer some of the necessary courses.

It usually takes from 5 to 10 years after beginning an actuarial career to complete the entire series of examinations required for full professional status. These examinations cover general mathematics, specialized actuarial mathematics, and all phases of the insurance business. Those considering an actuarial career should take at least the beginning examination covering general mathematics while still in college. Success in passing the first two examinations helps beginners to evaluate their potential as actuaries. Those who pass these examinations usually have better opportunities for employment and receive a higher starting salary. Advanced examinations, usually taken by those in junior actuarial positions, require extensive home study and experience in insurance work.

The Society of Actuaries gives 10 actuarial examinations for the life insurance and pension field; the Casualty Actuarial Society also gives 10 for the property and liability field. Since the first parts of the examination series of either society are the same, students may defer the selection of their insurance specialty until they become more familiar with the field. Persons who complete five examinations in the life insurance series or six in the casualty series are awarded "associate" membership in their respective society. Those who have passed an entire series receive full membership and the title "fellow."

Beginning actuaries often rotate among different jobs to learn various actuarial operations and to become familiar with different phases of insurance work. At first, their work may be rather routine, such as preparing calculations or tabulations for actuarial tables or reports. As they gain experience, they may supervise actuarial clerks, prepare correspondence and reports, and do research.

Advancement to more responsible work as assistant, associate, and chief actuary depends largely on job performance and the number of actuarial examinations passed. Many actuaries, because of their broad knowledge of insurance and related fields, are selected for administrative positions in other company activities, particularly in underwriting, accounting, or data processing departments. Many actuaries advance to top executive positions.

Employment Outlook

Employment of actuaries is expected to rise faster than the average for all occupations through the mid-1980's. In addition to job openings resulting from this growth, several hundred actuaries will be needed each year to replace those who retire, die, or transfer to other occupations. Job opportunities will be best for new college graduates who have passed at least one actuarial examination while still in school and have a strong mathematical and statistical background. However, because of the large number of persons expected to receive degrees in mathematics,

Actuaries discussing a problem.

and the large number of students taking actuarial examinations, competition for beginning jobs should remain keen.

Employment in this occupation is influenced by the volume of insurance sales, which will continue to grow over the next decade. Shifts in the age distribution of the population over the next decade will result in many more people with established careers and family responsibilities. This is the group traditionally responsible for the bulk of private insurance sales.

Increased sales, however, are only one determinant of demand. Changes in existing insurance practices are creating a need for more actuarial services. For example, passage of a "no-fault" automobile insurance plan would require companies writing automobile insurance to reevaluate their pricing structures in light of no-fault requirements. It is uncertain at this time whether Federal no-fault legislation will be enacted; however, the growing number of States enacting their own plans indicates continued strong demand for actuaries to make these analyses. The Pension Reform Act of 1974 is likely to stimulate employment of actuaries, particularly in consulting firms. As more States pass competitive rating laws, companies which previously relied on rating bureaus for actuarial data will expand existing actuarial departments or create new ones.

Changes in the way medical malpractice insurance is handled also may generate additional demand for actuaries.

Earnings and Working Conditions

In 1974, actuaries had average salaries over twice as high as the average for all nonsupervisory workers in private industry, except farming. New college graduates entering the life insurance field without having passed any actuarial exams averaged $9,800 in 1974, according to a survey of U.S. companies by the Life Office Management Association (LOMA). Applicants who had successfully completed the first exam received $10,400 and those who had passed two exams averaged $11,100. Salaries for actuaries in casualty companies generally are comparable to those offered by life companies.

In the Federal Government, new graduates with the bachelor's degree could start at $8,500 a year in late 1974. Applicants with either 1 year of graduate study or relevant work experience were hired at $10,500, and those with the master's degree started at $12,800 a year. Actuaries in the Federal Government averaged $22,800 a year in late 1974.

Beginning actuaries can look forward to a marked increase in earnings as they gain professional experience and successfully advance in either society's examination program. Insurance companies usually give merit increases averaging from $400 to $800 to their actuaries as they pass each successive examination leading to membership in either society. Associates averaged $16,400 a year in 1974; salaries for actuaries who were awarded full fellowship during that year averaged $22,700. Fellows with additional years of experience earned substantially more, and many top actuarial executives were paid over $35,000.

Sources of Additional Information

For facts about actuarial opportunities and qualifications, contact:

Casualty Actuarial Society, 200 East 42nd St., New York, N.Y. 10017.

Society of Actuaries, 208 South LaSalle St., Chicago, Ill. 60604.

CLAIM REPRESENTATIVES

(D.O.T. 168.288, 191.268, 241.168, and 249.268)

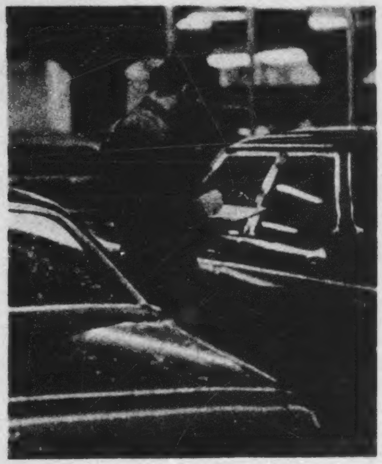
Nature of the Work

Fast and fair settlement of all claims is essential to any insurance company if it is to meet its commitments to policyholders and also protect its own financial well-being. The people who investigate claims, negotiate settlement with policyholders, and authorize payment are known as claim representatives—a group which includes claim adjusters and claim examiners.

When a property-liability (casualty) insurance company receives a claim, the *claim adjuster* determines the amount of the loss and whether the policy covers it. Adjusters use reports, physical evidence, and testimony of witnesses in investigating a claim. When their company is liable, they negotiate with the claimant and settle the case.

Adjusters must make sure that settlements are in line with the real extent of the loss. They must protect their company from false or inflated claims but, at the same time, settle valid claims fairly and promptly. Some adjusters are allowed to issue checks on company funds; most, however, submit their findings to claim examiners who review them to insure that proper procedures have been followed and then authorize payment.

Some adjusters work with all lines of insurance. Others specialize in claims from property damage by fire, marine loss, automobile damage, workers' compensation loss, or bodily injury. Several States have "no-fault" automobile insurance plans that relieve the adjuster from determining responsibility for a loss. Adjusters in these States still must decide the amount of loss, however. A growing number of casualty companies employ spe-



Adjuster determines extent of auto body damage.

cial claims people to settle small claims, usually minor automobile or homeowner damage claims. These claim workers, generally called "inside adjusters" or "telephone adjusters," contact claimants by telephone or mail and have the policyholder send repair costs, medical bills, and other statements to the company. Many companies centralize this operation in a drive-in claims center where the cost of repair is determined and a check is issued on the spot.

Adjusters work away from the office most of the time. They may be called to the site of an accident or to the location of a fire or burglary. Adjusters make their own schedules of the activities needed to dispose of a claim properly. They also keep written or taped records of information obtained from witnesses and other sources and prepare reports of their findings.

In life insurance companies, the counterpart of the claim adjuster is the *claim examiner*, who investigates the details surrounding questionable claims or those exceeding a specified amount. They may check claim applications for completeness and accuracy, interview medical specialists, consult policy files to verify information on a claim, or calculate benefit payments. Generally, examiners are authorized to investigate and approve payment on all claims up to a certain limit; larger claims are referred to a senior examiner.

Examiners checking incorrect or questionable claims may correspond with investigating companies, field managers, agents, or the family of the insured. Claim examiners occasionally travel to obtain information by personal interview, or contact State insurance departments and other insurance companies. In addition to verifying claims and approving payment, examiners also maintain records of settled claims and prepare reports to be submitted to their company's data processing department. Some experienced examiners serve on committees, conduct surveys of claim practices within their company, and help devise more efficient ways to process claims. They sometimes testify in court on contested claims.

Places of Employment

About 125,000 persons worked as claim representatives in 1974.

The majority of claim adjusters worked for insurance companies that sell property and liability coverage. Some were employed by independent adjusting firms that contract their services for a fee. These independents range from national companies employing hundreds of adjusting specialists to small 3- or 4-person operations. A relatively small number of adjusters represent the insured rather than the insurance company. These 'public adjusters' usually are retained by banks, financial or-

Claim examiner calculates benefit payment.

ganizations, and other business firms to handle fire and other losses to property. They negotiate claims against insurance companies and deal with adjusters for such companies.

Most claim examiners worked for life insurance companies in large cities such as New York, Hartford, Chicago, San Francisco, and Dallas, where most home offices are located.

Adjusters may travel to almost any area of the United States, since claims must be settled locally. Occasionally, the adjuster may travel to the scene of a disaster, such as a hurricane or a riot, to work with local personnel. Some cases result in travel outside the United States.

Training, Other Qualifications, and Advancement

Although a growing number of insurance companies prefer claim representatives to have a college degree, many hire those without college training, particularly if they have specialized experience. For example, persons experienced in automobile repair work may qualify as auto adjusters, and those with clerical work experience might be hired as inside adjusters.

No specific field of college study is recommended. Although courses in insurance, economics, or other business subjects are helpful, a major in almost any college field is adequate preparation. An adjuster who has a business or accounting background might specialize in loss from business interruption or damage to merchandise. Those with college training in engineering will find their education helpful in adjusting industrial claims.

Most large insurance companies provide beginning claim adjusters and examiners on-the-job training and home study courses. Claim representatives are encouraged to take courses designed to enhance their professional skills. For example, the Insurance Institute of America offers a 6-semester study program leading to a diploma in insurance loss and claim adjusting upon successful completion of six examinations. Adjusters can prepare for these examinations by independent home study or through company or public classes. A professional Certificate in Insurance Adjusting also is available from the College of Insurance in New York City.

The Life Office Management Association (LOMA) in cooperation with the International Claim Association offers a claims education program for life and health examiners. The program is part of the LOMA Institute Insurance Education Program leading to the professional designation, FLMI (Fellow, Life Management Institute) upon successful completion of eight written examinations.

About three-fourths of the States require adjusters to be licensed. Despite wide variation in State licensing requirements, applicants usually must comply with one or more of the following: Pass a written examination covering the fundamentals of adjusting; furnish character references; be 20 or 21 years of age and a resident of the State; offer proof that they have completed an approved course in insurance or loss adjusting; and file a surety bond.

Because they often work closely with claimants, witnesses, and other insurance professionals, representatives must be able to adapt to many different persons and situations. They should be able to communicate effectively and gain the respect and cooperation of people from different backgrounds. For example, when adjusters' evaluations of claims differ from those of the persons who have suffered the loss, they should be able to explain their conclusions tactfully. Examiners need to be familiar with medical and legal terms and practices and Federal and State insurance laws and regulations. Because they may have to check premium payments, policy values, and other numerical items in processing a claim, examiners should be adept at making mathematical calculations. Both adjusters and examiners should have a good memory and enjoy working with details.

Beginning adjusters and examiners work on small claims under the supervision of an experienced worker. As they learn more about claim investigation and settlement, they are assigned claims that are higher in loss value and more difficult. Trainees are promoted as they demonstrate competence in handling assignments and progress in the courses they take. Because of the complexity of insurance regulations and claims procedures, workers who lack formal academic training may advance more slowly than those with 2 years or more of college. Employees who show unusual competence in claims work or outstanding administrative skills may be promoted to department supervisor in a field office or to a managerial position in the home office. Qualified adjusters and examiners can transfer to other departments, such as underwriting or data processing.

Employment Outlook

Employment of claim representatives is expected to grow about as fast as the average for all occupations through the mid-1980's as the number of insurance claims continues to increase. In addition to jobs created by growth of the occupation, many others will result from the need to replace workers who die, retire, or transfer to other jobs.

Several factors point to a growing volume of insurance and a resulting need for claim adjusters. Shifts in population patterns over the next decade will insure a steadily rising number of workers entering their most productive years. These workers and their families are likely to seek insurance protection as they purchase homes, automobiles, and other consumer durables. Expanding business will need protection for new plants and equipment and for insurance covering workers' compensation and product liability. As more people live and work in densely populated areas, the increased risk of automobile accident, fire, or theft should result in a greater number of claims.

Growth of this occupation may be slower than in recent years as no-fault automobile insurance plans enable adjusters to handle more cases. The growing emphasis on drive-in claim centers and claim handling by telephone also should reduce the demand for automobile adjusters while it stimulates demand for inside adjusters. Independent adjusters who specialize in automobile damage claims should continue to suffer some loss of business. Prospects are expected to be quite good for adjusters who specialize in other types of claims or those who can move into other lines of adjusting.

Prospects are much less favorable for claim examiners. Employment of examiners in casualty companies should rise about as fast as for adjusters; however, much slower growth is expected for life insurance examiners as increased use of computers enables them to process more claims, especially routine ones and those that arise under group policies.

Earnings and Working Conditions

According to an American Insurance Association-American Mutual Insurance Alliance-National Association of Independent Insurers survey of property and liability companies, claim adjusters averaged about $11,900 a year in 1974; inside adjusters earned average salaries of about $8,300. Most public adjusters are paid a percentage of the amount of the settlement—generally 10 percent. Adjusters are furnished a company car or are reimbursed for use of their own vehicles for business purposes. Salaries of claim adjusters are about one and one-half times the average earnings for all nonsupervisory workers in private industry, except farming; salaries of inside adjusters are slightly above this average.

A survey of life insurance companies by the Life Office Management Association revealed that claim examiners earned average salaries of $11,200 a year in 1974. According to the survey of property and liability companies, casualty claim examiners averaged $13,300. Claim supervisors in casualty companies and life companies averaged between $14,000 and $15,000 and many earned more than $20,000 a year. Claim examiners earn nearly twice as much as the average for all nonsupervisory workers in private industry, except farming.

Claim adjusting is not a desk job. It requires that a person be physically fit because much of the day may be spent in traveling from one place to another, walking about outdoors, and climbing stairs. Adjusters may have to work evenings or weekends in order to interview witnesses and claimants when they are available. Since most companies provide 24-hour claim service to their policyholders, some adjusters always must be on call. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Claim examiners have desk jobs that require no unusual physical activity. Although the average workweek for examiners is 35 to 40 hours, they may work longer at times of peak claim loads or when quarterly and annual statements are prepared. They also may need to travel occasionally.

Sources of Additional Information

General information about a career as a claim examiner or adjuster is available from the home offices of many life and property and liability insurance companies.

Information about licensing requirements for claim adjusters may be obtained from the department of insurance in each State.

Information about career opportunities in these occupations also may be obtained from:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

For information about public insurance adjusting, contact:

National Association of Public Adjusters, 1613 Munsey Building, Baltimore, Md. 21202.

Career information on life insurance claim examining is available from:

Institute of Life Insurance, 277 Park Ave., New York, N.Y. 10017.

UNDERWRITERS

(D.O.T. 169.188)

Nature of the Work

Insurance companies assume millions of dollars in risks each year, by transferring chance of loss from their policyholders to themselves. Underwriters appraise and select the risks their company will insure. (The term underwriter sometimes is used in referring to insurance agents; see the statement on Insurance Agents and Brokers elsewhere in this book for a discussion of that occupation.)

Underwriters decide whether their companies will accept risks after analyzing information in insurance applications, reports from loss control consultants, medical reports, and actuarial studies (reports that describe the probability of insured loss). Some routine applications that require very little independent judgment are handled by computers. Generally, however, underwriters use considerable personal judgment in making decisions. Because these decisions are seldom reviewed at a higher level, underwriters have great responsibility. Their companies may lose business to competitors if they appraise risks too conservatively or have to pay many future claims if their underwriting actions are too liberal.

When deciding that a policy is an acceptable risk, an underwriter may outline the terms of the contract, including the amount of the premium. Underwriters frequently correspond with policyholders, agents, and managers about policy cancellations or requests for information. In addition, they sometimes accompany salespeople on appointments with prospective customers.

Most underwriters specialize in one of three major categories of insurance: life, property and liability, or health. Life insurance underwriters may further specialize in one type of life insurance or more, such as group or individual policies. The property and liability underwriter specializes by type of risk insured, such as fire, automobile, marine, or workers' compensation. Some underwriters, called commercial account underwriters, handle business insurance exclusively. They often must evaluate a firm's entire operation in appraising its insurance application.

A standard group insurance policy insures all persons in a specified group through a single contract at uniform premium rates; this type of group policy generally provides life or health insurance protection. The group underwriter analyzes the overall composition of the group to be sure that total risk is not excessive. A different type of group policy finding increasing acceptance is the policy that provides the members of a group—a labor union, for example—with an individual policy geared to their own circumstances. These policies generally are in the casualty field, covering automobiles, pleasure boats, and homes. The casualty underwriter analyzes the application of each group member and makes individual appraisals. Some group underwriters attend meetings with union or employer representatives to discuss the types of policies available to their groups.

Underwriter analyzes information presented on policy application.

Places of Employment

An estimated 20,000 persons worked as insurance underwriters in 1974. Over three-fourths were property and liability underwriters working in regional or home offices throughout the United States; most life insurance underwriters are in home offices in a few large cities, such as Hartford, New York, Chicago, Dallas, and Los Angeles.

Training, Other Qualifications, and Advancement

For beginning underwriting jobs, most insurance companies seek college graduates who have degrees in liberal arts or business administration, but a major in almost any field provides a good general background. Some high school graduates who begin as underwriting clerks may be trained as underwriters after they demonstrate an aptitude for the work.

College graduates usually start as trainees or junior underwriters. They study claim files to learn the factors associated with certain types of losses, and carry out their work assignments under an experienced risk appraiser. Many supplement on-the-job training with courses and instruction at home office schools or local colleges and universities. Many firms pay tuition and the cost of books for those who satisfactorily complete underwriting courses. Some companies offer salary increases as an incentive. Independent study programs are available through the American Institute of Property and Liability Underwriters, the American College of Life Underwriters, the Home Office Life Underwriters Association, the Institute of Home Office Underwriters, and the Life Office Management Association.

Underwriting can be a satisfying career for persons who like working with details and enjoy relating and evaluating information. In addition to analyzing problems, underwriters must make prompt decisions and be able to communicate their ideas to others. They must also be imaginative and aggressive, especially when they have to get additional information from outside sources.

Experienced underwriters who complete study courses may advance to chief underwriter or underwriting manager. Some underwriting managers are promoted to senior managerial jobs after several years.

Employment Outlook

Employment of underwriters is expected to rise about as fast as the average for all occupations through the mid-1980's as insurance sales continue to expand. Each year many jobs will become available as the occupation grows and as those who die, retire, or transfer to other work are replaced.

Several factors underlie the expected growth in the volume of insurance and the resulting need for underwriters. Over the next decade, a much larger portion of our population will enter their most productive years. As this traditional market for life insurance expands, the volume of insurance sales also should rise. This will occur as more individuals purchase life insurance to protect their families' standard of living, finance their childrens' education, or provide retirement income. Property and liability insurance sales also should expand as purchases of automobiles, pleasure boats, and other consumer durables increase. Both spending for new home construction and the American public's growing security consciousness should contribute to demand for more extensive insurance protection. Expanding businesses will need protection for new plants and equipment and insurance for workers' compensation and product liability. Heightened competition among insurance companies and changes in regulations affecting investment profits also are expected to increase the insurance industry's need for competent underwriters.

Earnings and Working Conditions

Underwriters in life insurance averaged $12,500 a year in 1974, according to a Life Office Management Association (LOMA) survey. Senior life underwriters (those with 5 years' experience) averaged $14,300, while senior group underwriters earned average salaries of $14,800. Supervisors of underwriting in life insurance companies averaged $15,000 to $20,000. In most cases, underwriters in larger companies earned higher salaries.

An American Insurance Association-American Mutual Insurance Alliance-National Association of Independent Insurers survey of companies that sell property and liability insurance showed that experienced underwriters averaged $11,300 a year in 1974. Earnings varied substantially by underwriting specialty; senior commercial lines underwriters averaged $13,100, while personal lines underwriters earned average salaries of $10,900. Experienced underwriters earn over 1 1/2 times the average earnings of nonsupervisory workers in private industry, except farming. Underwriting supervisors in property and liability companies averaged $15,100 a year in 1974; many earned over $17,500.

Most underwriters have desk jobs that require no unusual physical activity. Although the average week is 37 hours, underwriters sometimes work overtime. Most insurance companies have liberal vacation policies and other employee benefits. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Sources of Additional Information

General information about a career as an insurance underwriter is available from the home offices of many life insurance and property and liability insurance companies. Information about career opportunities as an underwriter also may be obtained from:

Institute of Life Insurance, 277 Park Ave., New York, N.Y. 10017.

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

American Mutual Insurance Alliance, 20 N. Wacker Dr., Chicago, Ill. 60606.

FBI SPECIAL AGENTS

(D.O.T. 375.168)

Nature of the Work

Federal Bureau of Investigation (FBI) Special Agents investigate violations of Federal laws such as bank robberies, kidnappings, frauds against the Government, thefts of Government property, espionage, and sabotage. The FBI, which is part of the U.S. Department of Justice, has jurisdiction over many different Federal investigative matters. Special Agents, therefore, may be assigned to any type of case, although those with specialized training usually work on cases related to their background. Agents with an accounting background, for example, may investigate bank embezzlements or fraudulent bankruptcies.

Because the FBI is a fact-gathering agency, its Special Agents function strictly as investigators, collecting evidence in cases in which the United States is or may be an interested party. (The FBI does not give personal protection to individuals or do police work to insure that the law is obeyed. Such matters are handled by local and State law enforcement agencies.) In their casework, Special Agents may interview people, observe the activities of suspects, and participate in raids. Because the FBI's work is highly confidential, Special Agents may not disclose any of the information gathered in the course of their official duties to unauthorized persons, including members of their families. At times, agents have to testify in court about cases which they investigate.

Although they work alone on most assignments, agents communicate with their supervisors by radio or telephone as the circumstances dictate. In performing potentially dangerous duties, such as arrests and raids, two or more agents are assigned to work together.

Places of Employment

About 8,600 persons were Special Agents in 1974. The FBI has been accepting applications from women since 1972, and 30 women now work as Special Agents.

Most agents were assigned to the FBI's 59 field offices located throughout the Nation and in Puerto Rico. They worked in cities where field office headquarters are located or in resident agencies (suboffices) established under field office supervision to provide prompt and efficient handling of investigative matters arising throughout the field office territory. Some agents are assigned to the Bureau headquarters in Washington, D.C., which supervises all FBI activities.

Training, Other Qualifications, and Advancement

To be considered for appointment as an FBI Special Agent, an applicant usually must be a graduate of a State-accredited law school or a college graduate with a major in accounting. The law school training must have been preceded by at least 2 years of undergraduate col-

FBI special agent photographs a weapon.

lege work. Accounting graduates must have at least 1 year of experience in accounting, auditing, or a combination of both.

From time to time, as the need arises, the FBI accepts applications from persons who have a 4-year college degree with a physical science major or fluency in a foreign language, and also from persons who have 3 years of professional, executive, complex investigative, or other specialized experience.

Applicants for the position of FBI Special Agent must be citizens of the United States, at least 23 and not more than 35 years old, and willing to serve anywhere in the United States or Puerto Rico. They must be capable of strenuous physical exertion, and have excellent hearing and vision, normal color perception, and no physical defects which would prevent their using firearms or participating in dangerous assignments. All applicants must pass a rigid physical examination, as well as written and oral examinations testing their knowledge of law or accounting and their aptitude for meeting the public and conducting investigations. All of the tests except the physical examinations are given by the FBI at its facilities. Background and character investigations are made of all applicants. Appointments are made on a probationary basis and become permanent after 1 year of satisfactory service.

Each newly appointed Special Agent is given about 14 weeks of training at the FBI Academy at the U.S. Marine Corps Base in Quantico, Va. before assignment to a field office. During this period, agents receive intensive training in defensive tactics and the use of firearms. In addition, they are thoroughly schooled in Federal criminal law and procedures, FBI rules and regulations, fingerprinting, and investigative work. After assignment to a field office, the new agent usually works closely with an experienced agent for about 2 weeks before handling any assignments independently.

All administrative and supervisory jobs are filled from within the ranks by selecting those FBI Special Agents who have demonstrated the ability to assume more responsibility.

Employment Outlook

The jurisdiction of the FBI has expanded greatly over the years. Although it is impossible to forecast Special Agent personnel requirements, employment may be expected to increase with growing FBI responsibilities.

The FBI provides a career service and its rate of turnover is traditionally low. Nevertheless, the FBI is always interested in applications from qualified persons who would like to be considered for the position of Special Agent.

Earnings and Working Conditions

The entrance salary for FBI Special Agents was $13,379 in late 1974. Special Agents are not appointed under Federal Civil Service regulations, but, like other Federal employees, they receive periodic within-grade salary raises if their work performance is satisfactory; they can advance in grade as they gain experience.

Special Agents are subject to call 24 hours a day and must be available for assignment at all times. Their duties call for some travel, for they are assigned wherever they are needed in the United States or Puerto Rico. They frequently work longer than the customary 40-hour week and, under specified conditions, receive overtime pay up to about $3,350 a year. They are granted paid vacations, sick leave, and annuities on retirement.

Sources of Additional Information

The Federal Bureau of Investigation, U.S. Department of Justice, Washington, D.C. 20535.

POLICE OFFICERS

(D.O.T. 375.118 through .868 and 377.868)

Nature of the Work

The security of our Nation's cities and towns greatly depends on the work of local police officers whose jobs range from controlling traffic to preventing and investigating crimes. Whether on or off duty, these officers are expected to exercise their authority whenever necessary.

Police officers who work in a small community have many duties. In the course of a day's work, they may direct traffic at the scene of a fire, investigate a housebreaking, and give first aid to an accident victim. In a large police department, by contrast, officers usually are assigned to a specific type of duty. Most officers are detailed either to patrol or traffic duty; smaller numbers are assigned to special work such as accident prevention or operation of communications systems. Others work as detectives (plain-clothes officers) assigned to criminal investigation; still others, as experts in chemical and microscopic analysis, firearms identification, and handwriting and fingerprint identification. In very large cities, a few officers may work with special units such as mounted and motorcycle police, harbor patrols, helicopter patrols, canine corps, mobile rescue teams, and youth aid services.

Most newly recruited police officers begin on patrol duty. Recruits may be assigned to such varied areas as congested business districts or outlying residential areas. They may cover their beats alone or with other officers, and they may ride in a police vehicle or walk on "foot" patrol. In any case, they become thoroughly familiar with conditions throughout their area and, while on patrol, remain alert for anything unusual. They note suspicious circumstances, such as open windows or lights in vacant buildings, as well as hazards to public safety such as burned-out street lights or fallen trees. Officers also watch for stolen automobiles and enforce traffic regulations. At regular intervals, they report to police headquarters through call boxes, by radio, or by walkie-talkie. They prepare reports about their activities and may be called on to testify in court when cases result in legal action.

Places of Employment

About 480,000 full-time officers worked for local police departments in 1974. Although most were men, an increasing number of women are employed in police work.

Some cities have very large police forces. For example, New York has over 30,000 police officers and Chicago over 13,000. Hundreds of small communities employ fewer than 25 each. Women police officers work mainly in large cities.

Training, Other Qualifications, and Advancement

Local civil service regulations govern the appointment of police officers in practically all large cities and in many small ones. Candidates must be U.S. citizens, usually at least 21 years of age, and must meet certain height and weight standards. Eligibility for appointment depends on performance in competitive examinations as well as on education and experience. The physical examinations often include tests of strength and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police work, candidates are interviewed by a senior officer at police headquarters, and their character traits and background are investigated. In some police departments, candidates also may be interviewed by a psychiatrist or a pyschologist, or be given a personality test. Although police officers work independently, they must perform their duties in line with laws and departmental rules. They should enjoy working with people, and should want to serve the public.

In large police departments, where most jobs are found, applicants usually must have a high school education. A few cities require some college training and some hire law enforcement students as police interns. A few police departments accept applicants who have less than a high school education as recruits, particularly if they have worked in a field related to law enforcement.

More and more, police departments are encouraging applicants to take post-high school training in sociology and psychology. As a result, more than 500 junior colleges, colleges, and universities now offer programs in law enforcement. Other courses helpful in preparing for a police career include English, American history, civics and government, business law, and physics. Physical education and sports are especially helpful in developing the stamina and agility needed for police work.

Young persons who have completed high school can enter police work in some large cities as police cadets, or trainees, while still in their teens. As paid civilian employees of the police department, they attend classes to learn police skills and do clerical work. They may be appointed to the regular force at age 21 if they have all the necessary qualifications.

Before their first assignments, officers usually go through a period of training. In small communities, recruits learn by working for a short time with experienced officers. Training provided in large city police departments is more formal and may last several weeks or a few months. This training includes classroom instruction in constitutional law and civil rights; in State laws and local ordinances; and in accident investigation, patrol, and traffic control. Recruits learn how to use a gun, defend themselves from attack, administer first aid, and deal with emergencies.

Police officers usually become eligible for promotion after a specified length of service. In a large department, promotion may allow an officer to specialize in one type of police work such as laboratory work, traffic control, communications, or work with juveniles. Promotions to the rank of sergeant, lieutenant, and captain usually are made according to a candidate's position on a promotion list, as determined by scores on a written examination and on-the-job performance.

Many types of training help police officers improve their performance on the job and prepare for advancement. Through training given at police department academies and colleges, officers keep abreast of crowd-control techniques, civil defense, legal developments that affect their work, and advances in law enforcement equipment. Many police departments encourage officers to work toward college degrees, and some pay all or part of the tuition.

Employment Outlook

Police work is attractive to many. The job frequently is challenging and involves much responsibility. Furthermore, layoffs are rare. In periods of relatively high unemployment, the number of persons seeking police employment may be greater than the number of openings. However, the written examinations and strict physical requirements always eliminate many applicants. The outlook should be good for persons having some college training in law enforcement. Opportunities should also be available for women and minority applicants as many departments recruit these workers to make police departments more representative of the populations they serve.

Law enforcement is complex and requires an approach tailored to the particular problems of each city. The police department of a city with a large mobile population is likely to emphasize traffic control, preventive patrol, and cooperation with police agencies in the surrounding areas. In smaller cities, or those with well established communities and fewer employment and recreation centers, police work may be less specialized. In either case, however, the usual way of increasing police protection is to provide more officers for duty.

The number of officers employed will depend on the amount of money made available by local governments. Because of the essential nature of police work, it is likely that funding for law enforcement will have high priority and that the employment of city police officers will rise faster than the average for other occupations through the mid-1980's.

Earnings and Working Conditions

In 1974, entry level salaries for police officers varied widely from city to city. In some smaller communities, officers earned less than $600 a month, while some major cities offered over $1,000 a month to new employees. Most officers receive regular salary increases during the first few years of employment until they reach a set maximum for their rank. Maximum earnings ranged from about $800 to over $1,200 a month in 1974.

Promotion to a higher rank brings a higher basic salary. Sergeants, for example, started at a salary as high as $1,300 a month in 1974 and in the largest cities, lieutenants began at over $1,400 a month. In general, police officers are paid about one and one-half times as much as nonsupervisory workers in private industry, except farming.

Police departments usually provide officers with special allowances for uniforms and furnish revolvers, night sticks, handcuffs, and other required equipment.

The scheduled workweek for police officers usually is 40 hours. Because police protection must be provided around the clock, in all but the smallest communities some officers are on duty over weekends, on holidays, and at night. Police officers are subject to call any time their services are needed and may work overtime in emergencies. In some departments, overtime is paid at straight time or time and one-half; in others, officers may be given an equal amount of time off on another day of the week.

Police officers generally are covered by liberal pension plans, enabling many to retire at half pay by the time they reach age 55. In addition, paid vacations, sick leave, and health and life insurance plans frequently are provided.

Police officers may have to work outdoors for long periods in all kinds of weather. The injury rate is higher than in many occupations and reflects the risks officers take in pursuing speeding motorists, capturing lawbreakers, and dealing with public disorder.

Sources of Additional Information

Information about entrance requirements may be obtained from local civil service commissions or police departments.

Additional information describing careers as police officers is available from:

International Association of Chiefs of Police, 11 Firstfield Rd., Gaithersburg, Md. 20760.

Fraternal Order of Police, National Headquarters, 3094 Bertha St., Flint, Mich. 48504.

STATE POLICE OFFICERS

(D.O.T. 375.118, .138, .168, .228, .268, and .388)

Nature of the Work

The laws and regulations that govern the use of our Nation's roadways are designed to insure the safety of all citizens. State police officers (sometimes called State troopers) patrol our highways and enforce these laws.

State police officers issue traffic tickets to motorists who violate the law. At the scene of an accident, they direct traffic, give first aid, call for emergency equipment including ambulances, and write reports to be used in determining the cause of the accident.

In addition, State police officers provide services to motorists on the highways. For example, they radio for road service for drivers in mechanical trouble, direct tourists to their destination, or give information about lodging, restaurants, and tourist attractions.

State police officers also provide traffic assistance and control during road repairs, fires, and other emergencies, as well as for special occurrences such as parades and sports events. They sometimes check the weight of commercial vehicles, conduct driver examinations, and give information on highway safety to the public.

In addition to highway responsibilities, State police may investigate crimes, particularly in areas that do not have a police force. They sometimes help city or county police catch lawbreakers and control civil disturbances. State highway patrols, however, normally are restricted to vehicle and traffic matters.

Some police officers work with special State police units such as the mounted police, canine corps, and marine patrols. Others instruct trainees in State police schools, pilot police aircraft, or specialize in fingerprint classification or chemical and microscopic analysis of criminal evidence.

State police officers also write reports and maintain police records. Some officers, including division or bureau chiefs responsible for training or investigation and those who command police operations in an assigned area, have administrative duties.

Places of Employment

About 45,500 State police officers were employed in 1974. Although almost all were men, positions for women are expected to increase in the future.

The size of State police forces varies considerably. The largest force (in California) has over 5,000 officers; the smallest (in North Dakota) has fewer than 100. One State (Hawaii) does not maintain a police force.

Training, Other Qualifications, and Advancement

State civil service regulations govern the appointment of State police officers. All candidates must be citizens of the United States. Other entry requirements vary, but most States require that applicants have a high school education or an equivalent combination of education and experience and be at least 21 years old.

Officers must pass a competitive examination and meet physical and personal qualifications. Physical requirements include standards of height, weight, and eyesight. Tests of strength and agility often are required. Because honesty and a sense of responsibility are important in police work, an applicant's character and background are investigated.

Although State police officers work independently, they must perform their duties in line with department rules. They should want to serve the public and be willing to work outdoors in all types of weather.

In all States, recruits enter a formal training program for several months. They receive classroom instruction in State laws and jurisdictions, and they study procedures for accident investigation, patrol, and traffic control. Recruits learn to use guns, defend themselves from attack, handle an automobile at high speeds, and give first aid. After gaining experience, some officers take advanced training in police science, administration, law enforcement, or criminology. Classes are held at junior colleges, colleges and universities, or special police institutions such as the National Academy of the Federal Bureau of Investigation.

High school and college courses in English, government, psychology, sociology, American history, and physics help in preparing for a police career. Physical education and sports are useful for developing stamina and agility. Completion of a driver education course and training received in military police schools also are assets.

Police officer recruits serve a probationary period ranging from 6 months to 3 years. After a specified length of time, officers become eligible for promotion. Most States have merit promotion systems that require officers to pass a competitive examination to qualify for the next highest rank. Although the organization of police forces varies by State, the typical avenue of advancement is from private to corporal, to sergeant, to first sergeant, to lieutenant, and then to captain. Police officers who show administrative ability may be promoted to higher level jobs such as commissioner or director.

In some States, high school graduates may enter State police work as cadets. These paid civilian employees of the police organization attend classes to learn various aspects of police work and are assigned nonenforcement duties. Cadets who qualify may be appointed to the State police force at age 21.

Employment Outlook

State police employment is expected to grow much faster than the average for other occupations. Although most jobs will result from this growth, some openings will be created as officers retire, die, or leave the occupation for other reasons. As job openings are filled from the ranks of available applicants, the increased interest of women in police work will result in greater employment of women for patrol duties.

Although some State police will be needed in criminal investigation and other nonhighway functions, the greatest demand will be for officers to work in highway patrol. This is the result of a growing, more mobile population. In ever increasing numbers, Americans are using the motor vehicle as a source of recreation. Motorcycles, campers, and other recreational vehicles will continue to add to the Nation's traffic flow and require additional officers to insure the safety of highway users.

Because law enforcement work is becoming more complex, specialists will be needed in crime laboratories and electronic data processing centers to develop administrative and criminal information systems. However, in many departments, these jobs will be filled by civilian employees rather than uniformed officers.

Earnings and Working Conditions

In 1974, beginning salaries for State police officers ranged from almost $600 to about $1,000 a month. The most common entry rates ranged from $600 to $700 a month. Although starting salaries are normally higher in the West and lower in the South, State police officers on the average earn about 1 1/2 times as much as nonsupervisory workers in private industry, except farming.

State police generally receive regular increases, based on experience and performance, until a specified maximum is reached. In 1974, maximum rates ranged from about $750 to over $1,200 a month; maximum rates were most commonly between $900 and $1,000 a month. Earnings increase with promotions to higher ranks. The most common maximum salaries for State police sergeants in 1974 were between $1,000 and $1,200. Lieutenants earned more, often between $1,200 and $1,300 a month.

State police agencies usually provide officers with uniforms, firearms, and other necessary equipment, or give special allowances for their purchase.

In many States, the scheduled workweek for police officers is 40 hours. Although the workweek is longer in some States, hours over 40 are being reduced. Since police protection must be provided around the clock, some officers are on duty over weekends, on holidays, and at night. Police officers also are subject to emergency calls at any time.

State police usually are covered by liberal pension plans. Paid vacations, sick leave, and medical and life insurance plans frequently are provided.

The work of State police officers is sometimes dangerous. They always run the risk of an automobile accident while pursuing speeding motorists or fleeing criminals. Officers also face the risk of injury while apprehending criminals or controlling disorders.

Sources of Additional Information

Information about specific entrance requirements may be obtained from State civil service commissions or State police headquarters, usually located in each State capital.

HEALTH AND REGULATORY INSPECTORS (GOVERNMENT)

(D.O.T. 168.168, and .287)

Nature of the Work

Protecting the public from health and safety hazards, prohibiting unfair trade and employment practices, and raising revenue are included in the wide range of responsibilities of government. Health and regulatory inspectors help insure observance of the laws and regulations that govern these responsibilities.

The duties, titles, and responsibilities of Federal, State, and local health and regulatory inspectors vary widely. Some types of inspectors work only for the Federal Government while others also are employed by State and local governments. Many other workers employed as accountants, agricultural cooperative extension service workers, and other agricultural professionals also have inspection duties.

Health Inspectors. Health inspectors work with engineers, chemists, microbiologists, and health workers to insure compliance with public health and safety regulations governing food, drugs, and various other consumer products. They also administer regulations that govern the quarantine of persons and products entering the United States from foreign countries. The major types of health inspectors are: food and drug, meat and poultry, agricultural quarantine inspectors, and sanitarians. In addition, some inspectors work in a field which is closely related to food inspection—agricultural commodity grading.

Most *food and drug inspectors* specialize in one area of inspection such as food, feeds and pesticides, weights and measures, or drugs and cosmetics. Some, especially those who work for the Federal Government, may be proficient in several of these areas. Working individually or in teams under the direction of a senior or supervisory inspector they travel throughout a geographical area to check periodically firms that produce, handle, store, and market food, drugs, and cosmetics. They look for evidence of inaccurate product labeling, decomposition, chemical or bacteriological contamination, and other factors that could result in a product becoming harmful to consumer health. They assemble evidence of violations, using portable scales, cameras, ultraviolet lights, container sampling devices, thermometers, chemical testing kits, and other types of equipment.

Product samples collected as part of their examinations are sent to laboratories for analysis. After completing their inspection, inspectors discuss their observations with the management of the plant and point out any areas where corrective measures are needed. They prepare written reports of their findings, and, when necessary, compile evidence that may be used in court if legal actions must be taken to effect compliance with the law.

Federal and State laws empower *meat and poultry inspectors* to inspect meat, poultry, and their byproducts to insure that they are wholesome and safe for public consumption. Working as part of a constant onsite team under the general supervision of a veterinarian, they inspect meat and poultry slaughtering, processing, and packaging operations. They also check to see that products are labeled correctly and that proper sanitation is maintained in slaughtering and processing operations.

Agricultural quarantine inspectors protect American agricultural products from the introduction and spread of foreign plant pests and animal diseases. To safeguard the health of crops, forests, and gardens, they inspect ships, aircraft, railroad cars, and motor vehicles entering the United States for the presence of restricted or prohibited plant or animal materials.

Sanitarians, working primarily for State and local governments, perform a variety of inspection duties to help insure that the food people eat, the water they drink, and the air they breathe meet government standards. They check the cleanliness and safety of food and beverages produced in dairies and processing plants, or served in restaurants, hospitals, and other institutions. They often examine the handling, processing, and serving of food for compliance with sanitation rules and regulations.

Sanitarians concerned with waste control oversee the treatment and disposal of sewage, refuse, and garbage. They examine places where pollution is a danger, perform tests to detect pollutants, and collect air or water samples for analysis. Sanitarians determine the nature and cause of the pollution, then initiate action to stop it.

In large local and State health or agriculture departments, sanitarians may specialize in areas of work such as milk and dairy products, food sanitation, waste control, air pollution, institutional sanitation, and occupational health. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Agricultural commodity graders apply quality standards to various commodities to insure that retailers and consumers receive good and reliable products. They generally specialize in an area such as egg products, processed or fresh fruits and vegetables, grain, or dairy products. They inspect samples of a particular product to determine its quality and grade, and issue official grading certificates. Graders also may inspect the plant and equipment to insure that adequate sanitation standards are maintained.

Regulatory Inspectors. Regulatory inspectors insure compliance with various laws and regulations that protect the public welfare. Important types of regulatory inspectors are: immigration; customs; aviation safety; mine; wage-hour compliance; alcohol, tobacco, and firearms; and occupational safety inspectors.

Immigration inspectors interview and examine people seeking admission, readmission, or the privileges of passing through or residing in the United States. They inspect the passports of those seeking to enter the United States to determine whether they are legally eligible to enter and to verify their citizenship, status, and identity. Immigration inspectors also prepare reports, maintain records, and process applications and petitions by aliens for privileges such as immigrating to or living temporarily in the United States.

Customs inspectors enforce the laws governing U.S. imports and exports. Stationed at airports, seaports, and border crossing points, they count, weigh, gauge, measure, and sample commercial cargoes entering and leaving the United States to determine the amount of tax that must be paid. They also inspect baggage and articles worn or carried by the passengers and crew of ships, aircraft, and motor vehicles to insure that all merchandise being brought through ports of entry is declared and the proper taxes paid.

Aviation safety officers insure that Federal Aviation Administration (FAA) regulations that govern the quality and safety of aircraft equipment and personnel are maintained. Aviation safety officers may inspect aircraft manufacturing, maintenance, or operations procedures. They usually specialize in inspecting either commercial or general aviation aircraft. They are responsible for the inspection of aircraft manufacturing and of major repairs. They also certify aircraft pilots and schools, pilot examiners, flight instructors, and instructional materials.

Mine inspectors work to enhance the health and safety of miners and to promote good mining practices. To insure compliance with safety laws and regulations, mine inspectors visit mines and related facilities to obtain information on health and safety conditions.

Mine inspectors discuss their findings with the management of the mine, prepare written reports that incorporate their findings and decisions, and issue notices of findings that describe violations and hazards that must be corrected. They also investigate and prepare reports on mine accidents and direct rescue and firefighting operations when fires or explosions occur.

Wage-hour compliance officers inspect the employer's time, payroll, and personnel records to insure compliance with the provisions of various Federal laws on minimum wages, overtime, pay, employment of minors, and equal employment opportunity. They often interview employees to verify the employer's records and to check for any complaints.

Alcohol, tobacco, and firearms inspectors insure that the industries which manufacture these products comply with the provisions of revenue laws and other regulations on operating procedures, unfair competition, and trade practices. They spend most of their time inspecting distilleries, wineries, and breweries; cigar and cigarette manufacturing plants; wholesale liquor dealers and importers; firearms and explosives manufacturers, dealers, and users; and other regulated facilities. They periodically audit these establishments to determine that appropriate taxes are correctly determined and paid.

Places of Employment

Over 110,000 people, 5 percent of them women, worked as health and regulatory inspectors in 1974. The largest single employer of food and drug inspectors is the U.S. Food and Drug Administration, but the majority work for State governments. Meat and poultry inspectors and commodity graders who work in processing plants are employed mainly by the U.S. Department of Agriculture. Agricultural quarantine inspectors work either for the U.S. Public Health Service or the U.S. Department of Agriculture. Sanitarians work primarily for State and local governments.

Regulatory inspectors work for various agencies within the Federal Government, mainly in regional and district offices distributed throughout the United States. For example, aviation safety officers work for the Federal Aviation Administration; wage-hour compliance officers, for the Department of Labor; mine inspectors, the Department of the Interior; and alcohol, tobacco, and firearms inspectors, the Treasury Department. Immigration, customs, and agricultural quarantine inspectors work at U.S. airports, seaports, border crossing points, and at foreign airports and seaports. They are employed by the Justice and Treasury Departments.

Training, Advancement, and Other Qualifications

Because inspectors perform such a wide range of duties, qualifications for employment in these positions vary greatly. The Federal Government requires a passing score on the Professional and Administrative Career Examination (PACE) for several inspector occupations, including immigration; customs; wage and hour compliance; alcohol, tobacco, and firearms; occupational safety; and consumer safety (food and drug). To take this examination, a bachelor's degree or 3 years of responsible work experience, or a combination of the two, are required. In some cases, agencies will give preference to an applicant whose course work or work experience is related to the field of employment.

Other Federal inspectors must pass an examination based on specialized knowledge, in addition to having work experience in related fields. These include commodity inspectors such as those in meat, poultry, livestock, and egg products.

Air safety inspectors must have considerable experience in aviation maintenance, and an FAA Air Frame and Power Plant certificate. In addition, various pilot certificates and considerable flight experience are required, with the type dependent on the inspection duties. Many air safety inspectors receive both their flight training and mechanical training in the Armed Forces. No written examination is required.

Applicants for mine safety inspector positions generally must have specialized work experience in mine management or supervision, or possess a skill such as electrical engineering (for mine electrical inspectors). In some cases, a general aptitude test may be required. Advancement to a supervisory position is competitive.

Some Civil Service registers including those for agricultural quarantine inspectors and fruit and vegetable graders, rate applicants solely on their experience and education and require no written examination.

Qualifications for inspectors at the State and local level are usually similar to those for Federal employees. However, this may vary among government employers, particularly at the local level.

All inspectors are trained in the laws and inspection procedures related to their specific field through a combination of classroom and on-the-job training. In general, people who want to become health and regulatory inspectors should be able to accept responsibility and like detailed work. They should be neat and personable and able to express themselves well orally and in writing.

All Federal Government inspectors are promoted on a Civil Service "career ladder." This means that, assuming satisfactory work performance, workers will advance automatically, usually at 1-year intervals, to a specified maximum level. Above this level (usually supervisory positions), advancement is competitive, based on needs of the agency and individual merit.

Employment Outlook

Employment of health and regulatory inspectors as a group is expected to increase faster than the average for all occupations through the mid-1980's. The growth in employment of health inspectors is expected to be more rapid than that of regulatory inspectors. In addition to job opportunities stemming from growth, many inspectors will be needed each year to replace those who die, retire, or transfer to other occupations.

Increased food consumption caused by population growth and greater public concern over potential health hazards, should create additional jobs for food and drug, meat and poultry, and other commodity inspectors and graders. Public concerns for improved quality and safety of consumer products also should result in new legislation in these areas, requiring additional inspectors to insure compliance.

Aviation industry growth, increased international travel, and increases in the volume of U.S. imports and exports should continue to create new openings for aviation safety officers, quarantine and immigration inspectors, and customs inspectors. Increasing coal mining activity and concern over mine safety should create additional mine inspector jobs. Continued public pressure for equal employment rights should cause a growing need for wage-hour compliance officers.

Earnings and Working Conditions

With the exception of mine inspectors and aviation safety officers, the Federal Government paid health and regulatory inspectors and graders starting salaries of $8,500 or $10,520 a year in late 1974, depending on the type of position and the qualifications of the applicant. Aviation safety officers and mining inspectors usually received starting salaries of $12,841.

Salaries of experienced meat and poultry inspectors, egg product inspectors, agricultural quarantine inspectors, alcohol, tobacco, and firearms inspectors, and customs and immigration inspectors were almost $13,000 a year in late 1974. Experienced food and drug inspectors (consumer safety officers), agricultural quarantine inspectors, and wage-hour compliance officers usually received salaries of about $15,500 from the Federal Government in late 1974. Mine inspector and aviation safety officers earned between $18,500 and $22,000. Nonsupervisory sanitarians had average starting salaries of almost $10,000 in late 1974, according to a survey by the International Personnel Management Association in selected U.S. cities and counties. Those working for State governments earned about $1,000 less.

Most health and regulatory inspectors live an active life, meeting many people and working in a variety of environments. Many travel frequently and are usually furnished with an automobile or reimbursed for travel expenses.

At times inspectors must work under unfavorable working conditions. For example, meat and poultry, and alcohol, tobacco, and firearms inspectors frequently come in contact with strong, unpleasant odors; mine inspectors often spend a great deal of time in mines where they are exposed to the same hazards as miners. Many inspectors work long and often irregular hours.

Sources of Additional Information

For facts about inspector careers in the Federal Government, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

More detailed information on qualifications for Federal jobs is available from local Civil Service Commission offices or from individual Federal agencies.

Information about career opportunities as inspectors in State and local governments is available from State civil service commissions, usually located in each State capital, or from local government offices.

OCCUPATIONAL SAFETY AND HEALTH WORKERS

(D.O.T. 010.081; 012.081 and .188; 079.188; 168.168, .268, and .284; 379.387; 821.387; and 909.128)

Nature of the Work

People in the occupational safety and health field have the challenging job of insuring a safe and healthful environment for workers and safe products for consumers. Safety and health workers in a number of different occupations strive to control occupational accidents and diseases, property losses, and injuries from unsafe products. This statement discusses both professional and paraprofessional occupations in private industry; for a discussion of related occupations in government, see the statement on Health and Regulatory Inspectors elsewhere in the book.

The largest number of safety workers are *safety engineers*. Although all of them are concerned with preventing accidents, their specific tasks depend on where they work. For example, the safety engineer working in a large manufacturing plant (D.O.T. 012.081) may develop a comprehensive safety program covering several thousand employees. This usually entails detailed analysis of each job in the plant to identify potential hazards so that preventive measures can be taken. When accidents do occur, safety engineers in manufacturing plants investigate to determine the cause. If poor design, improper maintenance, or mechanical failure is involved, they use their technical skills to correct the situation and prevent its recurrence. When human error is the cause of an accident, safety engineers may establish training courses for plantworkers and supervisors or reemphasize existing ones.

Safety engineers who work for trucking companies (D.O.T. 909.128) study schedules, routes, loads, and speeds to determine their influence on trucking accidents. They also inspect heavy rigs, such as trucks and trailers, to suggest ways of safer operation. In the mining industry, safety engineers (D.O.T. 010.081) may inspect underground or open-pit areas to insure compliance with State and Federal laws, design protective equipment and safety devices for mine machinery, or lead rescue activities during emergencies.

Many safety engineers are directly concerned with the safety of their company's product. They work closely with design engineers to develop models which meet all safety standards and they monitor the manufacturing process to insure the safety of the finished product.

Safeguarding life and property against loss from fire, explosion, and related hazards is the job of the *fire protection engineer* (D.O.T. 012.188). Those who specialize in research investigate problems such as fires in high-rise buildings or the manufacture, handling, and storage of flammable materials. Fire protection engineers in the field use these research findings to identify hazards and devise ways to correct them. For example, new findings concerning flashpoints (the temperature at which different materials will ignite) are valuable to the engineer designing storage facilities in a chemical plant.

Like safety engineers, fire protection engineers may have different job duties depending on where they work. One who works for a fire equipment manufacturing company may design new fire protection devices, while engineers in consulting firms work with architects and others to insure that fire safety is built into new structures. In contrast, fire protection engineers working for insurance rating bureaus (organizations that calculate basic costs of insurance coverage in particular areas) inspect private, commercial, and industrial properties to evaluate the adequacy of fire protection for the entire area. Many fire protection engineers have special expertise in one area or more of fire protection, such as sprinkler or fire detection systems.

Losses in the workplace cannot be reduced without measures to eliminate hazards to workers' health. Designing and maintaining a healthful work environment is the job of the *industrial hygienist* (D.O.T. 079.188). These health professionals are concerned with how noise, dust, vapors, and other hazards common to the industrial setting affect workers' health. After a problem is detected, perhaps by analyzing employee medical records, the industrial hygienist at the jobsite may take air samples, monitor noise levels, or measure radioactivity levels in the areas under investigation.

Other industrial hygienists work in private laboratories or in those maintained by large insurance companies or industrial firms. Laboratory hygienists analyze air samples,

Industrial hygienist taking an air sample.

do research on the reliability of health equipment such as respirators, or investigate the effects of exposure to chemicals or radiation. Some hygienists specialize in problems of air and water pollution. For example, these health professionals may work with government officials, environmental groups, organized labor, and plant management to develop a system to screen harmful substances before they enter and pollute a river.

Loss control and *occupational health consultants* (D.O.T. 168.168) in property-liability insurance companies perform many services for their clients. These range from correcting a single hazard in a small business to devising a program to eliminate or reduce all losses arising out of a large firm's operation. When dealing with a new account, the consultant makes a thorough inspection of the plant and then confers with management to formulate a program that meets the company's needs. The consultant may, for example, help set up plant health programs and medical services, assist plant personnel to insure that a new facility meets all safety requirements, or train plant safety people. Safety and health consultants also help their company's underwriters determine whether a risk is acceptable and the amount of premium to charge.

Places of Employment

An estimated 25,000 persons were engaged in occupational safety and health work in 1974. About one-quarter of these carried the professional designation, Certified Safety Professional, Certified Industrial Hygienist, or Member, Society of Fire Protection Engineers. Many others who are not certified performed professional level work, while a relatively small number were employed in the occupational safety and health field as technicians and inspectors. Property and liability insurance companies employ many occupational safety and health workers to provide engineering, consulting, and inspection services to their clients. Others worked for a variety of industrial, manufacturing, and commercial concerns.

These workers are needed wherever large numbers of people are concentrated and industrial development occurs. Insurance consultants generally have their headquarters in a region's major city and travel to and from the sites they visit.

Training, Other Qualifications, and Advancement

Entry level safety and health professionals generally need at least a bachelor's degree in engineering or a science. A more specialized degree, such as one in safety management, industrial safety, or fire protection engineering, often is helpful in getting a good job. Many employers prefer applicants with a graduate degree in areas such as industrial hygiene, safety engineering, or occupational safety and health engineering, or those with prior industrial work experience. Some employers will hire graduates of 2-year college curriculums as technicians, particularly if they have work experience related to the job.

Continuing education is necessary to stay abreast of changing technologies, new ideas, and emerging trends. Many insurance companies offer training seminars and correspondence courses for their staffs. The Occupational Safety and Health Administration

(OSHA) conducts courses for safety and health workers on topics such as occupational injury investigation and radiological health hazards. The recognized marks of achievement in the field are the designations Certified Safety Professional; Certified Industrial Hygienist; and Member, Society of Fire Protection Engineers. Certification is conferred by the Board of Certified Safety Professionals, the American Board of Industrial Hygiene, or the Society of Fire Protection Engineers after the candidate completes the required experience and passes an examination.

In addition to technical competence, safety and health workers must be able to communicate well and motivate others. They should be able to adapt quickly to different situations, being equally at ease with a representative of a local union, a supervisor in the welding shop, or a corporate executive. Because physical activity is basic to the job, good physical condition is necessary.

Workers with proven ability will find much room for advancement. In the insurance business, safety and health workers can be promoted to department manager in a small branch office, move up to larger branch offices, and finally take an executive position in the home office. In industrial firms, they can advance to plant safety and health manager or corporate manager over several plants. Although extensive experience is required, technicians can advance to professional safety and health positions.

Employment Outlook

Employment of safety and health workers is expected to increase faster than the average for all occupations through the mid-1980's as growing concern for occupational safety and health and consumer safety continues to generate programs and jobs. Many openings will arise also to replace workers who die, retire, or leave their jobs for other reasons.

Much of the employment growth is expected to occur in industrial and manufacturing firms. Many firms now without a safety and health program are expected to establish one, and others will upgrade and expand existing programs in response to government requirements, union interest, and rising insurance costs. The number of safety and health workers in casualty insurance companies also will increase as more small employers request the services of their insurer's engineering or loss control department. Prospects should be best for graduates of occupational safety or health curriculums.

Earnings and Working Conditions

Salaries of safety and health workers vary widely according to education, experience, and specialty. In manufacturing firms, persons with a bachelor's degree generally started at about $10,000 a year in 1974, according to the limited data available. Those with a graduate degree salaries, and technicians somewhat lower ones. Safety and health workers with several years' experience averaged $15,000 to $20,000, and corporate managers well over $20,000 a year. Insurance companies started their loss consultant trainees at about $9,000; senior consultants earned $12,000 to $16,000; and department managers were paid over $20,000 in 1974.

The amount of travel required depends upon job specialty and geographic location. For example, the plant safety engineer may travel only to seminars and conferences, while the insurance consultant may spend about half the time traveling between worksites. Usually, a car is furnished or safety professionals are reimbursed for the expenses of using their own vehicles.

Sources of Additional Information

For general information about professional safety careers, write to:

American Society of Safety Engineers, 850
Busse Highway, Park Ridge, Ill. 60068.

Also available from the Society is a booklet which lists colleges and universities offering degree programs in the occupational safety and health field.

Information concerning a career in industrial hygiene is available from:

American Industrial Hygiene Association,
665 Miller Rd., Akron, Ohio 44313.

Career information concerning fire protection engineering may be obtained from:

Society of Fire Protection Engineers, 60 Batterymarch St., Boston, Mass. 02110.

Career information on insurance loss control consulting is available from the home offices of many property-liability insurance companies.

EDUCATION AND RELATED OCCUPATIONS

More and more people are going to school for a greater portion of their lives than ever before, as increasingly complex and specialized skills and knowledge are called for in our growing economy. In addition, people of all ages are seeking to use their leisure time for personal growth and development. Teachers and librarians play vital roles in the educational process; their occupations are discussed in the following sections.

KINDERGARTEN AND ELEMENTARY SCHOOL TEACHERS

(D.O.T. 092.228)

Nature of the Work

Kindergarten and elementary school teachers introduce children to numbers, language, science and social studies, and develop students' capabilities in these subject areas. Their primary job is to provide a good learning environment and to plan and present programs of instruction using materials and methods designed to suit the students' needs.

Most elementary school teachers instruct a single group of 25 to 30 children in several subjects. In some schools two teachers or more "team teach" and are jointly responsible for a group of students or for a particular subject. A recent survey indicates that about 1 public elementary school teacher in 6 is a member of a teaching team

An increasing number of elementary school teachers specialize in one or two subjects and teach these subjects to several classes; 1 teacher in every 5 teaches on this departmentalized basis. Some teach special subjects such as music, art, or physical education, while others teach basic subjects such as English, mathematics, or social studies.

Besides the actual student instruction, teachers participate in many activities outside the classroom. They generally must attend regularly scheduled faculty meetings and may serve on faculty committees. They must prepare lessons and evaluate student performance. They also work with students who require special help and confer with parents and other school staff. To stay up-to-date on educational materials and teaching techniques, they participate in workshops and other inservice activities.

New forms of instructional media give teachers more opportunities to work with students. Also, about 4 out of every 10 public elementary school teachers have aides who generally do secretarial work and help supervise lunch and playground activities. Thus, growing numbers of teachers are freed from routine duties and can give more individual attention to students.

Places of Employment

About 1.3 million people—85 percent of them women—worked as elementary school teachers in 1974. An increasing number of men, concentrated heavily in the upper grades, teach at the elementary level.

Most teachers work in public elementary schools that have six grades; however, some teach in middle schools—schools that cover the 3 or 4 years between the lower elementary grades and 4 years of high school. Only about 12 percent of elementary school teachers work in nonpublic schools.

More than one-third of all public elementary teachers teach in urban areas; about one-fifth in cities of 250,000 or more; one-eighth in rural areas; and the remainder in small towns or suburban areas.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public elementary school teachers to be certified by the department of education in the State in which they work. Some States also require certification of teachers in private and parochial schools.

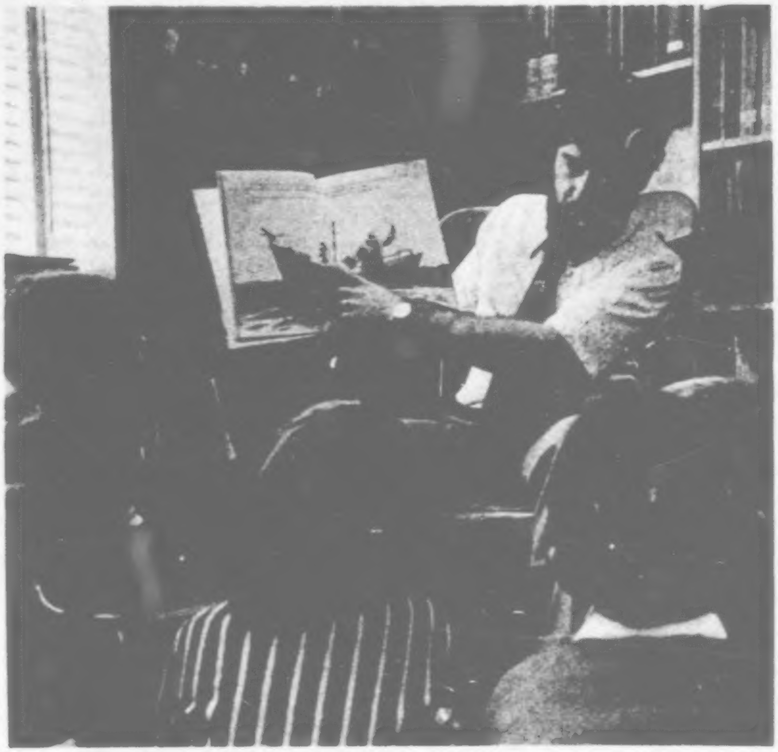
To qualify for certification, a teacher must study 4 years at an institution with an approved teacher education program. Besides a bachelor's degree which provides the necessary liberal arts background, States require that prospective teachers have student-teaching and education courses.

In 1974, 13 States required teachers to get supplementary post-graduate education—usually a master's degree or a fifth year of study—within a certain period after their initial certification. Some States required U.S. citizenship; some an oath of allegiance; and several a health certificate.

Local school systems sometimes have additional requirements for employment. Students should write to the local superintendent of schools and to the State department of education for information on specific requirements in the area in which they want to teach.

In addition to educational and certification requirements, a teacher should be dependable, have good judgment, and should have the desire and ability to work with children. Enthusiasm for teaching and the competence to handle classroom situations also are important.

Opportunities for advancement in elementary teaching come principally with experience. Teachers



may advance within a school system or transfer to another which recognizes experience and has a higher salary scale. Some teachers may advance to supervisory, administrative, or specialized positions. Advancement for most teachers consists of higher pay rather than more responsibility or a higher position, however.

Employment Outlook

Kindergarten and elementary school teachers are expected to face competition for jobs through the mid-1980's. If patterns of entry and reentry to the profession continue in line with past trends, the number of persons qualified to teach in elementary schools will exceed the number of openings.

The basic sources of teacher supply are recent college graduates qualified to teach at the elementary level and teachers seeking reentry to the profession. Reentrants, although more experienced, will face increasing competition from new graduates who command lower salaries and have more recent training.

Pupil enrollment is the basic factor underlying the need for teachers. Because of fewer births in the 1960's, elementary enrollments have been on the decline since they peaked at nearly 32 million in 1967. The National Center of Education Statistics projects that by 1979 the downward enrollment trend will halt at a level of 27 million, and enrollments again will advance to nearly 29 million by 1985.

However, a decline in the projected number of children born over the next decade could lessen the demand for teachers. While the trend has not been clearly established, since 1970 women have continued to have fewer children, and according to a recent survey, they expect to continue having smaller families than were common 10 years ago.

Teachers will be needed to fill new positions created by larger enrollments; to replace those who are not now certified; to meet the expected pressure for an improved pupil-teacher ratio; and to fill positions vacated by teachers who retire, die, or leave the profession for other reasons.

While the outlook based on past trends points to a competitive employment situation through the mid-1980's, several factors could influence the demand for teachers. Increased emphasis on early childhood education, on special programs for disadvantaged children, and on individual instruction may result in larger enrollments, smaller student-teacher ratios, and consequently an increased need for teachers. However, possible budget restraints for educational services might limit expansion.

Earnings and Working Conditions

According to the National Education Association, public elementary school teachers in 1974-75 averaged $11,234 a year. Average earnings in 1974 were over one and one-third times as much as the average earnings for all nonsupervisory workers in private industry, except farming. In the five highest paying States (Alaska, New York, Hawaii, California, and Illinois), teachers' salaries averaged more than $12,600; in the 10 States having the lowest salaries (Mississippi, Arkansas, Vermont, South Dakota, Kentucky, Oklahoma, North Dakota, South Carolina, West Virginia, and Nebraska), they averaged less than $9,200.

Public schools systems enrolling 6,000 or more pupils paid teachers with a bachelor's degree average starting salaries of $7,720 a year in 1973-74; those with a master's degree earned a starting average of $8,586.

Public elementary school teachers worked an average of about 36-1/2 hours a week in 1974. Additional time spent preparing lessons, grading papers, making reports, attending meetings, and supervising extra-curricular activities increased the total number of hours to about 46.

The elementary school teacher usually works 9 months and averages 181 days in the classroom and 4 workdays on nonteaching activities. In addition, many teach summer sessions, and others take courses for professional growth or work at other jobs during the summer months.

Employment in teaching is steady, and business conditions usually do not affect the market for teachers. In 1974, 38 States and the District of Columbia had tenure laws that insured the jobs of teachers who had successfully taught for a certain number of years.

Collective bargaining agreements cover an increasingly large number of teachers. In 1974, 31 States had enacted laws which required collective bargaining in the teacher contract negotiation process. Most public school systems that enroll 1,000 students or more bargain with teacher organizations over wages, hours, and the terms and conditions of employment.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

SECONDARY SCHOOL TEACHERS

(D.O.T. 091.228)

Nature of the Work

Secondary school teachers help prepare their students for future roles as citizens and jobholders. They introduce students to subjects ranging from world history and elementary algebra to anthropology and computer mathematics.

Secondary school teachers usually specialize in a particular field. English, mathematics, social studies, and science are the subjects most commonly taught. Other specialties include health and physical education, business education, home economics, foreign languages, and music. Increasingly, teachers are developing courses which deal with particular areas within the broad subjects so students may acquire in-depth as well as general knowledge of a field.

Secondary school teachers usually conduct classes in their specialty for five groups of students a day. The average daily pupil load for public shool teachers is 136 students.

Teachers design their classroom presentation to meet the demands of balanced curriculum and to suit the individual student's needs. Secondary school teachers instruct students at a single grade level or from different grades. They must consider instructional methods and materials that best meet the student's needs, as well as the subject matter.

Secondary school teachers also supervise study halls and homerooms, prepare lessons, grade papers, evaluate students, and attend meetings with parents and school personnel. Often they work with student groups outside of class. Teachers also participate in activities, such as workshops and college classes, to keep up-to-date on their subject specialty and on current trends in education.

Increasingly, in recent years, teachers have been able to devote more time towards improved instruction due to the increased availability of teacher aides who perform secretarial work, grade papers, and do other routine tasks. Developments in educational technology also have provided teachers with instructional media and other new materials and techniques to improve student learning.

Places of Employment

More than 1 million teachers worked in secondary schools in 1974. Of these, about one-half were women.

According to a recent survey, slightly more than one-half of all public secondary teachers work in senior high schools; about one-third teach at the junior high level. About one-tenth teach in junior-senior high schools, and a very small number are elementary-secondary combination teachers.

Of those in public schools, about 1 teacher in 5 works in a city with a population of 250,000 or more—1 in 8 in a city of less than 250,000. Over one-half teach in small-town or suburban schools; and about 1 in 7 in a rural location. Only about 1 teacher in 14 works in a nonpublic school.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require the certification of public secondary school teachers. Many States also require certification of secondary teachers in private and parochial schools.

In every State, the minimum educational requirement for certifica-

tion is a bachelor's degree. Moreover, 14 States have specified that a secondary school teacher must get additional education, usually a fifth year of study or a master's degree, within a certain period after beginning employment.

In 1974, the District of Columbia was the only jurisdiction requiring a master's degree for initial certification as a senior high school teacher. However, according to a recent national survey, 2 out of every 5 public secondary school teachers had a master's or higher degree.

The educational qualifications for secondary school teachers vary by State and by school system. Approved colleges and universities in every State offer programs which include the education courses and student-teaching that States require. They also offer the academic courses which qualify teachers in subject specialties taught at the secondary level.

States and local jurisdictions often have general teacher requirements, such as the recommendation of the college, a certificate of health, and citizenship. Prospective teachers may get complete information on such educational and general requirements from each State department of education and from the superintendent of schools in each community.

Personal qualifications which a secondary teacher must have include a desire to work with young people, an interest in a special subject, and the ability to motivate students and to relate knowledge to them.

For secondary teachers, education and experience provide the primary bases for advancement. Advancement to supervisory and administrative positions usually requires at least 1 year of professional education beyond the bachelor's degree and several years of successful classroom teaching. Some experienced teachers with special preparation may work as special school service personnel, such as school psychologists, reading specialists, or guidance counselors. Often these jobs require special certification as well as special education.

Employment Outlook

The supply of secondary school teachers through the mid-1980's will greatly exceed anticipated requirements if past trends of entry into the profession continue. As a result, prospective teachers are likely to face keen competition for jobs.

The prime sources of teacher supply are recent college graduates qualified to teach secondary school and teachers seeking to reenter the profession. Although reentrants have experience in their favor, many schools may prefer to hire new graduates who command lower salaries and whose training is more recent.

Pupil enrollment is the basic factor underlying the demand for teachers. The National Center for Education Statistics' projections indicate that enrollments in secondary schools will begin to decline in the mid-1970's after continuous growth through the 1960's and into the early 1970's. This decline in enrollments is expected to reduce the demand for teachers. As a result, over the 1974-85 period, nearly all teaching positions will stem from the need to replace teachers who die, retire, or leave the profession for other reasons. As a result, an increasing proportion of prospective teachers will have to consider alternatives to secondary school teaching. However, pressures for an improved pupil-teacher ratio and replacement of noncertified teachers could create additional openings.

Although the overall outlook for secondary teachers indicates a highly competitive market, employment conditions may be more favorable in certain fields. According to a recent survey, teacher supply was least adequate in mathematics, natural and physical sciences, industrial arts, special education, and some vocational-technical subjects.

Earnings and Working Conditions

According to the National Education Association, public secondary school teachers in 1974-75 averaged $1[illegible],826. This is one and one-half times the average for nonsupervisory workers in private industry, except farming. In the five highest paying States (New York, California, Alaska, Illinois, and Michigan), teachers' salaries averaged more than $13,000; in the five States having the lowest salaries (Arkansas, Kentucky, Mississippi, South Dakota, and Oklahoma), they averaged under $9,300 a year.

Beginning teachers with a bachelor's degree in school systems with enrollments of 6,000 or more earned average salaries of $7,720 in the school year 1973-74. New teachers with a master's degree started at $8,586 a year. Beginning teachers could expect regular salary increases as they gained experience and additional education.

A recent survey of public school teachers indicated that the average required school week for those in secondary schools was 37 hours.

However, when all teaching duties, including meetings, lesson preparation, and other necessary tasks are taken into consideration, the total number of hours spent working each week was slightly more than 48.

In some schools, teachers receive supplementary pay for certain school-related activities such as coaching students in sports and working with students in extracurricular activities, in music, dramatics, or school publications. About one-fourth of the public secondary teachers receive pay for extra duties, such as supervising extracurricular activities, and one-third supplement their incomes with earnings from additional school work.

One-sixth of public school teachers also work in their school systems during the summer. More than one-fourth hold summer jobs outside the school system. In all, about three-fifths of public secondary school teachers have extra earnings from summer work, additional school-year work, or a combination of the two.

During the school year, teachers work an average of 181 days. They average 26 teaching periods and 5 unassigned periods a week. Laws in 38 States and the District of Columbia ensure the employment of those who have achieved tenure status. Laws requiring collective bargaining of wages, hours, and the terms and conditions of employment cover increasing numbers of teachers.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

COLLEGE AND UNIVERSITY TEACHERS

(D.O.T. 090.168 through .999)

Nature of the Work

About 30 percent of all persons in the United States between the ages of 18 and 21 attended college in 1974. To meet the demand of students for higher education, colleges and universities hire teachers to provide instruction in many fields. The most common subjects include social sciences, teacher education, the physical sciences, health professions, fine and applied arts, English, the biological sciences, mathematics, foreign languages, and business and commerce.

Slightly more than one-half of all college and university teachers instruct undergraduates; another one-third teach both graduates and undergraduates; and about one-tenth work only with graduate students.

Most teachers lecture and conduct classroom discussions to present subject matter effectively. Many work with students in laboratories. Some teachers provide individual instruction or supervise independent study. Nearly one-third of the faculty in universities have teaching assistants. Some college and university teachers use closed-circuit television. In 2-year colleges especially, instruction is frequently machine-aided.

To be effective, college teachers must keep up with developments in their field by reading current material, participating in professional activities, and conducting research. Some publish books and articles. The importance of research and publication varies from one institutional level to another. In universities, about 70 percent of the faculty have published professional articles compared to 25 percent of 2-year college faculty. Also, in certain fields such as engineering and the physical sciences, the demand for research is strong.

In addition to time spent on preparation, instruction, and evaluation, college and university teachers participate in faculty activities; work with student organizations and individual students outside of classes; work with the college administration; and in other ways serve the institution and the community. Some are department heads and have supervisory duties.

Places of Employment

In 1974, about 622,000 teachers worked in more than 2,600 colleges and universities. About one-fourth of all college and university teachers are women. An estimated 399,000—nearly two-thirds—were full-time senior staff. Of the remainder, about 112,000 were part-time senior staff, and nearly 16,000 were full-time junior instructors; the rest generally worked as part-time assistant instructors, teaching fellows, teaching assistants, or laboratory assistants.

Of full-time faculty, about one-third teach in universities; nearly one-half work in 4-year colleges; and about one-seventh teach in 2-year colleges. About two-thirds of the faculty in universities and 4-year colleges teach in public institutions; nearly nine-tenths of the faculty in 2-year institutions work in public junior and community colleges.

Training, Other Qualifications, and Advancement

Most college and university

faculty are classified in four academic ranks: instructors, assistant professors, associate professors, and full professors. About 75 percent of all faculty are assistant, associate, or full professors, with the three ranks equally distributed. Ten percent are instructors.

To get an initial appointment, instructors generally must have a master's degree. For advancement to higher ranks, they need further academic training plus experience. Assistant professors usually need a year of graduate study beyond the master's degree and at least a year or two of experience as an instructor. Appointments as associate professors frequently demand the doctoral degree and an additional 3 years or more of college teaching experience. For a full professorship, the doctorate and extensive teaching experience are essential.

In addition to advanced study and college-level teaching experience, outstanding academic, administrative, and professional contributions influence advancement. Research, publication, and work experience in a subject area may hasten advancement.

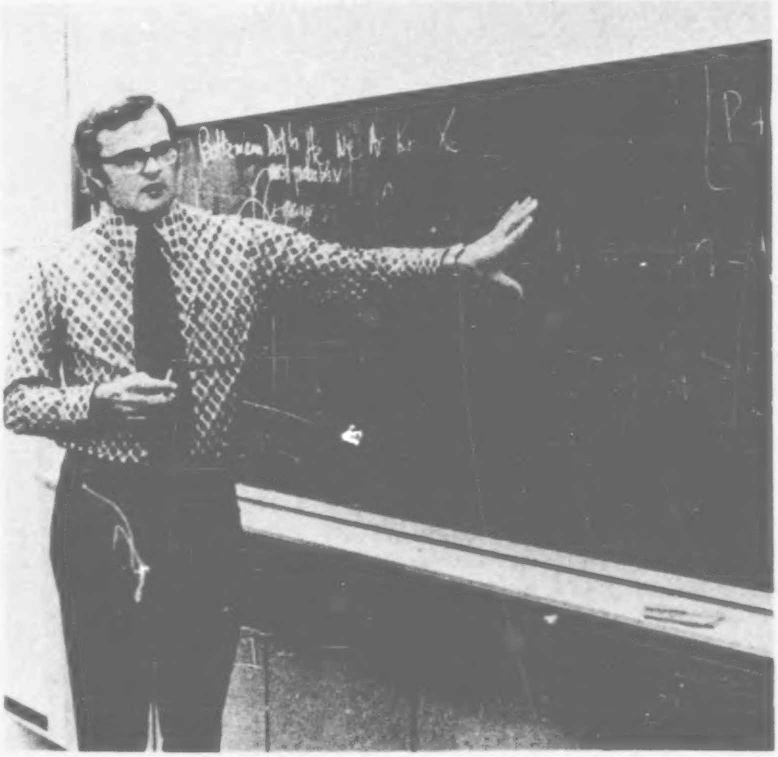
The ranks of college and university teachers and their educational backgrounds differ by institutional level. In universities, more than 50 percent of the faculty have doctoral degrees compared with about 10 percent in 2-year colleges. Correspondingly, more than 50 percent of the faculty in universities are either professors or associate professors, while in 2-year colleges, only 1 teacher in 4 is within these upper ranks. Conversely, in community and junior colleges, where the master's is the highest degree held by nearly three-fourths of the faculty, instructors constitute a relatively large faculty segment.

Employment Outlook

College and university teaching candidates are expected to face keen competition through the mid-1980's. The demand for college and university teachers is expected to fall. However, the principal source of teacher supply—master's and Ph. D. degree recipients—is expected to continue to grow. Consequently, a smaller proportion of each year's degree recipients will be needed for college teaching. An increasing proportion of prospective college teachers, therefore, will have to seek nonacademic jobs. Government and private industry should provide some positions, but some persons holding graduate degrees may find it necessary to enter occupations that have not traditionally required advanced study.

The basic factor underlying the demand for teachers is college enrollment. During the 1960's and early 1970's, teacher employment expanded due to growth in both the number of college-age persons and the proportion of 18- to 21-year-olds enrolled in college. The number of college-age persons will decline after 1978, and by the early 1980's, enrollment will taper off and begin to fall. As a result, the total number of college teachers needed over the 1974-85 period will decline, as compared with an 80-percent increase over the previous 11-year period.

The type and level of the institution and the extent to which it wishes to upgrade its faculty also will influence the demand for teachers. Although enrollments in the 1970's are expected to stabilize in 4-year colleges and universities, many institutions, including junior and community colleges, may hire additional Ph. D.'s to upgrade their faculties. Master's degree holders also will continue to find jobs in 2-year colleges. Public institutions are expected to continue to attract an



increasing proportion of total college enrollment. Thus, opportunities in public colleges will be greater than in private institutions.

Earnings and Working Conditions

In 1974-75, full-time college and university faculty on 9-10 month contracts averaged $16,704, or twice the average earnings for all nonsupervisory workers in private industry, except farming. Salaries varied, however, by teacher rank and by institutional level. Average salaries were:

Instructors	$12.825
Assistant professors	13.104
Associate professors	15.920
Professors	20.653

In general, larger institutions paid higher salaries. Salaries of teachers in 4-year colleges tended to be higher than those in 2-year colleges; university teachers averaged the most.

College and university teachers' salaries also vary by geographic region. According to a recent survey of 4-year colleges and universities, schools in the Mideast, New England, and Pacific regions paid the highest full-time faculty salaries.

Since about 2 out of 3 college teachers have 9 to 10-month contracts, many have additional summer earnings from research, writing for publication, or other employment. Royalties and fees for speaking engagements may provide additional earnings. Some teachers also undertake additional teaching or research projects or work as consultants.

College and university teachers also may enjoy certain benefits, including tuition waivers for dependents, housing allowances, travel allowances, and leaves of absence. Colleges typically grant a semester's leave after 6 or 7 years of employment.

About 85 percent of all college and university teachers work in institutions which have tenure systems. Of the full-time teachers employed in these institutions, over one-half are tenured. Under a tenure system, a teacher usually receives 1-year contracts during a probationary period ranging from 3 to 7 years; some universities award 2- or 3-year contracts. After the probationary period, institutions consider teachers for tenure (the assurance of continuing employment with freedom from dismissal without cause).

The working hours and environment of college teachers generally are favorable. Classrooms, office facilities, and laboratories usually are well-equipped and teachers have access to library facilities and clerical assistance.

College teachers usually have flexible teaching schedules. According to a recent survey, the undergraduate faculty in 4-year colleges and universities normally teach 12 hours a week and seldom more than 14 or 15 hours. Graduate faculty have a teaching load of about 10 hours a week. In addition to time spent in the classroom, college and university teachers devote much time to preparation and other duties. Overall, full-time faculty spend about 40 hours a week on school-related activities. For faculty in junior and community colleges, the normal teaching load is slightly heavier, but the total number of hours on the job are fewer.

Sources of Additional Information

Information on college teaching as a career is available from:

U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, Washington, D.C. 20202.

American Council on Education, 1 Dupont Circle NW., Washington, D.C. 20036.

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20065.

Professional societies in the various subject fields will generally provide information on teaching requirements and employment opportunities in their particular fields. Names and addresses of societies are given in the statements on specific professions elsewhere in this book.

LIBRARIANS

(D.O.T. 100.118 through .388)

Nature of the Work

Making information available to people is the job of librarians. They select and organize collections of books, pamphlets, manuscripts, periodicals, clippings, and reports, and assist readers in their use. In many libraries, they also provide phonograph records, maps, slides, pictures, tapes, films, paintings, braille and talking books, microfilms, and computer tapes.

User services and technical services are the two principal kinds of library work. Librarians in user services—for example, reference and children's librarians—work directly with the public. Librarians in technical services—for example, catalogers and acquisitions librarians—deal less frequently with the public; they order, classify, catalog, and in other ways prepare the materials for use.

The size of the library determines to a large extent the scope of a librarian's job. In small libraries, the job may include both user and technical services. The librarian may select and organize materials, publicize services, do research, and give reference help to groups and individuals. In large libraries, librarians usually specialize in either user or technical services. They may specialize further in certain areas, such as science, business, the arts, or medicine. Their work may involve reviewing and abstracting published materials and preparing bibliographies in their specialty.

Librarians generally are classified according to the type of library in which they work: public libraries, school media centers, college and university libraries, and special libraries.

Public librarians serve all kinds of people—children, students, research workers, teachers, and others. Increasingly, public librarians are providing special materials and services to culturally and educationally deprived persons, and to persons who because of physical handicaps cannot use conventional print.

The professional staff of a large public library system may include the chief librarian, an assistant chief, and several division heads who plan and coordinate the work of the entire library system. The system also may include librarians who supervise branch libraries and specialists in certain areas of library work. The duties of some of these specialists are briefly described in the following paragraphs.

Acquisition librarians purchase books and other materials and maintain a well-balanced library that meets the needs and interests of the public. *Catalogers* classify these materials by subject and otherwise describe them to help users find what they are looking for. *Reference librarians* answer specific questions and suggest sources of information that may be useful.

Some librarians work with specific groups of readers. *Children's librarians* serve the special needs of young people by finding books they will enjoy and showing them how to use the library. They may plan and conduct special programs such as story hours or film programs. Their work in serving children often includes working with school and community organizations. *Adult services librarians* suggest materials suited to the needs and interests of adults. They may cooperate in planning and conducting education programs, such as community development, public affairs, creative arts, problems of the aging, and home and family. *Young adult services librarians* help junior and senior high school students select and use books and other materials. They may organize programs of interest to young adults, such as book or film discussions or concerts of recorded popular and classical music. They also may coordinate the library's work with school programs. *Extension or outreach librarians working in bookmobiles* offer library services to people not adequately served by a public library such as those in inner city neighborhoods, migrant camps, rural communities, and institutions, including hospitals and homes for the aged.

School librarians instruct students in the use of the school library and help them choose from the media center's collection of print and nonprint materials items that are related to their interests and to classroom subjects. Working with teachers and supervisors, school librarians familiarize students with the library's resources. They prepare lists of materials on certain subjects and help select materials for school programs. They also select, order, and organize the library's materials. In some schools, they may work with teachers to develop units of study and independent study programs, or they may participate in team teaching. Very large high schools may employ several school librarians, each responsible for a particular function of the library program or for a special subject area.

College and university librarians serve students, faculty members, and research workers in institutions of higher education. They may provide general reference service or may work in a particular subject field, such as law, medicine, economics, or music. Those working on university research projects operate documentation centers that use computers and other modern devices to record, store, and retrieve specialized information. College and university librarians may teach classes in the use of the library.

Special librarians work in libraries maintained by government agencies and by commercial and industrial firms, such as pharmaceutical companies, banks, advertising agencies, and research laboratories. They provide materials and services covering subjects of special interest to the organization. They build and arrange the organization's information resources to suit the needs of the library users. Special librarians assist users and may conduct literature searches, compile bibliographies, and in other ways provide information on a particular subject.

Others called *information science specialists*, like special librarians, work in technical libraries or information centers of commercial and industrial firms, government agencies, and research centers. Although they perform many duties of special librarians, they must possess a more extensive technical and scientific background and a knowledge of new techniques for handling information. Information science specialists abstract complicated information into condensed, readable form, and interpret and analyze data for a highly specialized clientele. Among other duties, they develop classification systems, prepare coding and programming techniques for computerized information storage and retrieval systems, design information networks, and develop microfilm technology.

Places of Employment

Of the estimated 125,000 professional librarians employed in 1974, school librarians accounted for nearly one-half; public libraries and colleges and universities each employed about one-fifth. An estimated one-seventh worked in special libraries, including libraries in government agencies. Some librarians worked in correctional institutions, hospitals, and State institutions, while a small number served as consultants, and State and Federal Government administrators and faculty in schools of library science. The Federal Government employed about 3,200 professional librarians.

More than 85 percent of all librarians are women. In college and university libraries, however, men make up about 35 percent of the total professional staff. Men also are relatively numerous in law libraries and in special libraries concerned with science and technology.

Most librarians work in cities and towns. Those attached to bookmobile units serve widely scattered population groups.

Training, Other Qualifications, and Advancement

A professional librarian ordinarily must complete a 1-year master's degree program in library science. A Ph. D. degree is an advantage to those who plan a teaching career in library schools or who aspire to a top administrative post, particularly in a college or university library or in a large library system. For those who are interested in the special libraries field, a master's degree or doctorate in the subject of the library's specialization is highly desirable.

In 1974, 53 library schools in the United States were accredited by the American Library Association and offered a master's degree in library science (M.L.S.). In addition, many other colleges offer graduate programs or courses within 4-year undergraduate programs.

Most graduate schools of library science require graduation from an accredited 4-year college or university, a good undergraduate record, and a reading knowledge of at least one foreign language. Some schools also require introductory undergraduate courses in library science. Most prefer a liberal arts background with a major in an area such as the social sciences, the arts, or literature. Some schools require entrance examinations.

Special librarians and information science specialists must have extensive knowledge of their subject matter as well as training in library science. In libraries devoted to scientific information, librarians should be proficient in one foreign language or more. They also must be well informed about computerized methods for storing and retrieving technical information.

Most States require that public school librarians be certified and trained both as teachers and librarians. The specific education and experience necessary for certification vary according to State and the school district. The local superintendent of schools and the State department of education can provide information about specific requirements in an area.

In the Federal Government, beginning positions require completion of a 4-year college course and a master's degree in library science, or demonstration of the equivalent in experience and education by a passing grade on an examination.

Many students attend library schools under cooperative work-study programs that combine the academic program with practical work experience in a library. Scholarships for training in library science are available under certain State and Federal programs and from library schools, as well as from a number of the large libraries and library associations. Loans, assistantships, and financial aid also are available.

Librarians should be intellectually curious and able to express themselves verbally, and should have the desire and ability to help others use library materials.

Experienced librarians may advance to administrative positions or to specialized work. Promotion to these positions, however, is limited primarily to those who have completed graduate training in a library school, or to those who have specialized training.

Employment Outlook

The employment outlook for librarians is expected to be somewhat competitive through the mid-1980's. Although employment in the field is expected to grow over the period, the supply of persons qualified for librarianship is likely to expand as an increasing number of new graduates and labor force reentrants seek jobs as librarians.

The anticipated increase in demand for librarians in the late 1970's and early 1980's will not be nearly as great as it was in the 1960's. Then, school enrollments were rising rapidly and Federal expenditures supported a variety of library programs.

Fewer births during the 1960's will result in a slight decline in elementary and secondary school enrollments through the remainder of the 1970's and early 1980's. The effect of birth rates in the 1960's will begin to be manifested in colleges and universities in the early 1980's, when total degree-credit enrollment is expected to level off. In both the schools and the colleges and universities, as a result, the demand for librarians will increase at a slower pace than in the past.

On the other hand, requirements for public librarians are expected to increase through 1985. The growth of a better educated population will necessitate an increased number of librarians to serve the public. The educationally disadvantaged, handicapped, and various minority groups also will need qualified librarians to provide special services. Also, the expanding use of computers to store and retrieve information will contribute to the increased demand for information specialists and library automation specialists in all types of libraries.

In addition to openings from growth, replacements will be needed each year for librarians who retire, die, transfer to other types of work, or leave the labor force.

Employment opportunities will vary not only by type of library but also by the librarian's educational qualifications and area of specialization. Although the overall employment outlook is competitive, persons who are willing to seek positions in other geographical areas and in different types of libraries will have better opportunities. New graduates having more recent training may have an employment advantage over reentrants, delayed entrants, or transfers to the profession. Their lower beginning salaries, compared to more experienced workers, may also be an employment advantage.

Earnings and Working Conditions

Salaries of librarians vary by type of library, the individual's qualifications, and the size and geographical location of the library.

Starting salaries of graduates of library school master's degree programs accredited by the American Library Association averaged $9,423 a year in 1974, ranging from $8,956 in public libraries to $9,864 in special libraries. The average annual salary for special librarians was $13,900 in 1974. For librarians in college and university libraries, average salaries ranged from $8,700 a year for those with limited experience working in private 4-year colleges to over $13,000 for university librarians with more extensive experience. Salaries for library administrators ranged somewhat higher. Department heads in college libraries earned between $10,000 and $14,000 a year. In general, librarians earned about one and one-half times as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for librarians with a master's degree in library science was $12,841 a year in late 1974. The average salary for all librarians in the Federal Government was $17,013.

The typical workweek for librarians is 5 days, ranging from 35 to 40 hours. The work schedule of public and college librarians may include some weekend and evening work. School librarians generally have the same workday schedule as classroom teachers. A 40-hour week during normal business hours is common for government and other special librarians.

The usual paid vacation after a year's service is 3 to 4 weeks. Vacations may be longer in school libraries, and somewhat shorter in those operated by business and industry. Many librarians are covered by sick leave; life, health, and accident insurance; and pension plans.

Sources of Additional Information

Additional information, particularly on accredited programs and scholarships or loans, may be obtained from:

American Library Association, 50 East Huron St., Chicago, Ill. 60611.

For information on requirements for special librarians, write to:

Special Libraries Association, 235 Park Ave., South, New York, N.Y. 10003.

Information on Federal assistance for library training under the Higher Education Act of 1965 is available from:

Office of Libraries and Learning Resources, Office of Education, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20202.

Those interested in a career in Federal libraries should write to:

Secretariat, Federal Library Committee, Room 310, Library of Congress, Washington, D.C. 20540.

Material on information science specialists may be obtained from:

American Society for Information Science, 1140 Connecticut Ave. NW., Washington, D.C. 20036.

Individual State library agencies can furnish information on scholarships available through their offices, on requirements for certification, and general information about career prospects in their regions. State boards of education can furnish information on certification requirements and job opportunities for school librarians.

SALES OCCUPATIONS

Saleswork offers career opportunities for people who have completed high school as well as for college graduates, for those who want to travel and those who do not, and for salaried workers as well as for men and women who wish to run their own businesses.

Workers in these jobs may sell for manufacturers, service firms, wholesalers, or retailers. In 1974, over 5.4 million people were in sales occupations; almost 30 percent worked part time.

Training, Other Qualifications, and Advancement

Training requirements for saleswork are as varied as the work itself. Salesworkers who sell standardized merchandise such as magazines, candy, cigarettes, and cosmetics usually are trained on the job by experienced salesclerks; in some large stores, they may attend brief training courses. The salesworker who sells complex products or services, such as electronic equipment or liability insurance, needs more education and training than most retail salesclerks. For some positions, salesworkers must be college graduates with majors in a field such as engineering. Others get the necessary technical knowledge from university or manufacturers' courses. Still others learn through years of on-the-job experience, often supplemented by home study. Thus, a real estate agent may take university extension courses; a department store beauty counselor may participate in an industry-sponsored training program; or a jewelry salesworker may learn through years of observation and study on the job.

Salesworkers must understand the needs and viewpoints of their customers and be poised and at ease with strangers. Other important attributes for selling are energy, self-confidence, imagination, self-discipline, and the ability to communicate. Arithmetic skills are an asset. In almost all saleswork except retail trade, salesworkers need initiative to locate prospective customers and to plan work schedules. Four sales occupations in which college graduates are increasingly employed are discussed in this section.

INSURANCE AGENTS AND BROKERS

(D.O.T. 250.258)

Nature of the Work

Insurance agents and brokers sell policies that protect individuals and businesses against future losses and financial pressures. They may help plan financial protection to meet the special needs of a customer's family; advise about insurance protection for an automobile, home, business, or other property; or help a policyholder obtain settlement of an insurance claim.

Agents and brokers usually sell one or more of the three basic types of insurance: life, property-liability (casualty), and health. Life insurance agents, sometimes called life underwriters, offer policies that pay survivors when a policyholder dies. Depending on the policyholder's individual circumstances, a life policy can be designed to provide retirement income, funds for the education of children, or other benefits. Casualty agents sell policies that protect individual policyholders from financial losses as a result of automobile accidents, fire or theft, or other losses. They also sell industrial or commercial lines, such as workers' compensation, product liability, or medical malpractice insurance. Health insurance policies offer protection against the costs of hospital and medical care or loss of income due to illness or injury, and most life agents and casualty agents offer this type of insurance to their customers. Many agents also offer securites, such as mutual fund shares or variable annuities.

An insurance agent may be either an insurance company employee or an independent business person authorized to represent one or more insurance companies. Brokers are not under exclusive contract with any single company; instead, they place policies directly with the company that best meets a client's needs. Otherwise, agents and brokers do much the same kind of work.

They spend most of their time discussing insurance policies with prospective and existing customers. Some time must be spent in officework to prepare reports, maintain records, plan insurance programs that are tailored to prospects' needs, and draw up lists of prospective customers. Specialists in group policies may help an employer's accountants set up a system of payroll deductions for employees covered by the policy.

Places of Employment

As many as 450,000 agents and brokers sold insurance full time in 1974. In addition, thousands of others worked part time. About half of the agents and brokers specialized in life insurance; the rest, in some type of property/liability insurance. A growing number of agents offer both life and property-liability policies to their customers.

Agents and brokers are employed in cities and towns throughout the country, but most work near large population centers.

Training, Other Qualifications, and Advancement

Although many employers prefer college graduates for jobs selling insurance, most will hire high school

graduates with work experience. College training may help the agent grasp the fundamentals and procedures of insurance selling more quickly. Courses in accounting, economics, finance, business law, and insurance subjects are helpful.

All agents and most brokers must be licensed in the State where they plan to sell insurance. In most States, licenses are issued only to applicants who pass written examinations covering insurance fundamentals and the State insurance laws. Agents who plan to sell mutual fund shares and other securities also must be licensed by the State. New agents usually receive training at insurance company home offices or at the agencies where they will work. Beginners sometimes attend company-sponsored classes to prepare for examinations. Others study on their own and accompany experienced salesworkers when they call on prospective clients.

Agents and brokers can broaden their knowledge of the insurance business by taking courses at colleges and universities and attending institutes, conferences, and seminars sponsored by insurance organizations. The Life Underwriter Training Council (LUTC) awards a diploma in life insurance marketing to agents who successfully complete the Council's 2-year life program. They also offer courses in health insurance and equity products. As agents or brokers gain experience and knowledge, they can qualify for the Chartered Life Underwriter (CLU) designation by passing a series of examinations given by the American College of Life Underwriters. In much the same way, a property-liability agent can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing a series of examinations given by the American Institute for Property and Liability Underwriters, Inc. The CLU and CPCU designations are recognized marks of achievement in their respective fields.

Agents and brokers should be enthusiastic, self-confident, and able to communicate effectively. Because agents usually work without supervision, they need initiative to locate new prospects. For this reason, many employers seek people who have been successful in other jobs.

Insurance agents who show unusual sales ability and leadership may become a sales manager in a district office or assume a managerial job in a home office. A few agents may advance to top positions as agency superintendents or company vice-presidents. Many who have built up a good clientele prefer to remain in saleswork. Some, particularly in the property-liability field, eventually establish their own independent agencies or brokerage firms.

Employment Outlook

Employment of insurance agents and brokers is expected to grow about as fast as the average for all occupations through the mid-1980's as the volume of insurance sales continues to expand. Many additional jobs will open as agents and brokers die, retire, or leave their jobs to seek other work. Due to the competitive nature of insurance selling, beginners often leave their jobs because they have been unable to establish a sufficiently large clientele. Therefore, opportunities should be quite favorable for ambitious people who enjoy saleswork.

Future demand for agents and brokers depends on the volume of insurance sales. Volume should increase rapidly over the next decade as a larger proportion of the population enters the period of peak earnings and family responsibilities. Life insurance sales should grow as more families select policies designed to provide educational funds for their children and retirement income. Rising incomes also should stimulate the sale of equity products such as mutual funds, variable annuities, and other investments. Sales of property-liability insurance should rise as more consumer purchases are insured and as commercial coverages, such as product liability and workers' compensation, are expanded.

However, employment of agents and brokers will not keep pace with the rising level of insurance sales because more policies will be sold to groups and by mail. Also, agents should be able to handle more business as computers relieve them of time-consuming clerical tasks.

Earnings and Working Conditions

Beginners in this occupation often are guaranteed moderate salaries or advances on commissions while they are learning the business and building a clientele. Thereafter, most agents are paid a commission. The size of the commission depends on the type and amount of insurance sold, and whether the transaction is a new policy or a renewal. After a few years, an agent's commissions on new policies and renewals may range from $10,000 to $20,000 annually. A number of established and highly successful agents and brokers earn more than $30,000 a year.

Agents and brokers generally pay their own automobile and traveling expenses. In addition, those who own and operate independent businesses must pay office rent, clerical salaries, and other operating expenses out of their earnings.

Although insurance agents usually are free to arrange their own hours of work, they often schedule appointments during evenings and weekends for the convenience of clients. Some agents work more than the customary 40 hours a week.

Sources of Additional Information

General occupational information about insurance agents and brokers is available from the home office of many life and property-liability insurance companies. Information on State licensing requirements may be obtained from the department of insurance at any State capital.

Information about a career as a life insurance agent also is available from:

Institute of Life Insurance, 227 Park Ave., New York, N.Y. 10017.

Life Insurance Marketing and Research Association, 170 Sigourney St., Hartford, Conn. 06105.

The National Association of Life Underwriters, 1922 F St., NW., Washington, D.C. 20006.

For career information on property/liability agents, contact:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

National Association of Insurance Agents, Inc. 85 John St., New York, N.Y. 10038.

MANUFACTURERS' SALESWORKERS

(D.O.T. 260. through 298.458)

Nature of the Work

Practically all manufacturers—whether they make computers or can openers—employ salesworkers. Manufacturers' salesworkers sell mainly to other businesses—factories, railroads, banks, wholesalers, and retailers. They also sell to hospitals, schools, libraries, and other institutions.

Most manufacturers' salesworkers sell nontechnical products. They must be well informed about their firms' products and also about the special requirements of their customers. When salesworkers visit firms in their territory, they use an approach adapted to the particular line of merchandise. A salesworker who handles crackers or cookies, for example, emphasizes the wholesomeness, attractive packaging, and variety of these products. Sometimes salesworkers promote their products by displays in hotels and conferences with wholesalers and other customers.

Salesworkers who deal in highly technical products, such as electronic equipment, often are called sales engineers or industrial salesworkers. In addition to having a thorough knowledge of their firms' products, they must be able to help prospective buyers with technical problems. For example, they may try to determine the proper materials and equipment for a firm's manufacturing process. They then present this information to company officials and try to negotiate a sale. Often, sales engineers work with the research-and-development departments of their own companies to devise ways to adapt products to a customer's specialized needs. Salesworkers who handle technical products sometimes train their customers' employees in the operation and maintenance of new equipment, and make frequent return visits to be certain that it is giving the desired service.

Although manufacturers' salesworkers spend most of their time visiting prospective customers, they also do paperwork including reports on sales prospects or customers' credit ratings. In addition, they must plan their work schedules, draw up lists of prospects, make appointments, handle some correspondence, and study literature relating to their products.

Places of Employment

Almost 380,000 people—10 percent of them women—were manufacturers' salesworkers in 1974. About 21,000 were sales engineers. Some work out of home offices, often located at manufacturing

Manufacturers' salesworker takes order for camera equipment from photo buyer in a department store.

plants. The majority, however, work out of branch offices, usually in big cities near prospective customers.

More salesworkers are employed by companies that produce food products than by any other industry. Large numbers also work in the printing and publishing, chemicals, fabricated metal products, and electrical and other machinery industries. Most sales engineers work for companies that produce heavy machinery, transportation equipment, fabricated metal products, and professional and scientific instruments.

Training, Other Qualifications, and Advancement

Although high school graduates can be successful manufacturers' salesworkers, college graduates are preferred as trainees.

Manufacturers of nontechnical products often hire college graduates who have a degree in liberal arts or business administration. Some positions, however, require specialized training. Drug Salesworkers usually need training at a college of pharmacy. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire college-trained engineers or chemists. (Information on chemists, engineers, and others with the technical training suitable for work as manufacturers' salesworkers is given elsewhere in this book.

Beginning salesworkers take specialized training before they start on the job. Some companies, especially those that manufacture complex technical products, have formal training programs that last 2 years or longer. In some of these programs, trainees rotate among jobs in several departments of the plant and office to learn all phases of production, installation, and distribution of the product. Other trainees take formal class instruction at the plant, followed by on-the-job training in a branch office under the supervision of field sales managers.

A pleasant personality and appearance, and the ability to meet and get along well with many types of people are important. Because salesworkers may have to walk or stand for long periods or carry product samples, some physical stamina is necessary. As in most selling jobs, arithmetic skills are an asset.

Sales representatives who have good sales records and leadership ability may advance to sales supervisors, branch managers, or district managers. Those with managerial ability eventually may advance to sales manager or other executive positions; many top executive jobs in industry are filled by people who started as salesworkers.

Because of frequent contact with business people in other firms, salesworkers often transfer to other jobs. Some go into business for themselves as manufacturers' agents selling similar products of several manufacturers. Other experienced salesworkers find opportunities in advertising and marketing research.

Employment Outlook

Persons with sales ability should find the best opportunities for jobs as manufacturers salesworkers over the next 10 years. Although thousands of sales openings will arise each year because of employment growth and the need to replace experienced workers who leave their jobs, manufacturers are expected to be selective in hiring. They will look for ambitious people who are well trained and temperamentally suited for the job.

Employment growth in this field is expected to be slower than the average for all occupations, chiefly because of the trend toward wholesale distribution. Some growth will occur, however, because of the rising demand for technical products and the resulting need for trained salesworkers. In addition, industrial firms, chain stores, and institutions that purchase large quantities of goods at one time frequently buy directly from the manufacturer. The need for salesworkers will increase as manufacturers emphasize sales activities to compete for the growing number of these valuable accounts.

Earnings and Working Conditions

According to the limited information available, salaries for beginning salesworkers averaged about $9,000 a year in 1974, exclusive of commissions and bonuses. The highest starting salaries generally were paid by manufacturers of electrical and electronic equipment, construction materials, hardware and tools, and scientific and precision instruments.

Some manufacturing concerns pay experienced salesworkers a straight commission, based on their dollar amount of sales; others pay a fixed salary. The majority, however, use a combination of salary and commission, salary and bonus, or salary, commission, and bonus. Commissions vary according to the salesworkers' efforts and ability, the commission rate, location of their sales territory, and the type of product sold. Bonus payments may depend on individual performance, on performance of all salesworkers in the group or district, or on the company's sales. Some firms pay annual bonuses; others offer bonuses as incentive payments on a quarterly or monthly basis. In general, the earnings of manufacturers' salesworkers are higher than the average for all nonsupervisory workers in private industry, except farming.

Some manufacturers' salesworkers have large territories and do considerable traveling. Others usually work in the neighborhood of their "home base." When on business trips, salesworkers are reimbursed for expenses such as transportation and hotels. Some companies provide a car or pay a mileage allowance to salesworkers who use their own cars.

Manufacturers' salesworkers call at the time most convenient to customers and may have to travel at night or on weekends. Frequently, they spend evenings writing reports. However, some plan their schedules for time off when they want it. Most salesworkers who are not paid a straight commission receive 2 to 4 weeks' paid vacation, depending on their length of service. They usually share in company benefits, including life insurance, pensions, and hospital, surgical, and medical benefits.

Sources of Additional Information

For more information on the occupation of manufacturers' salesworker, write:

Sales and Marketing Executives International, Student Education Division, 380 Lexington Ave., New York, N.Y. 10017.

REAL ESTATE SALESWORKERS AND BROKERS

(D.O.T. 250.358)

Nature of the Work

Real estate salesworkers and brokers represent property owners in selling or renting their properties. They also are called real estate agents or, if they are members of the National Association of Realtors, "realtors" or "realtor associates."

Brokers are independent business people who not only sell real estate, but also rent and manage properties, make appraisals, and develop new building projects. In closing sales, brokers usually arrange for loans to finance the purchases, for title searches, and for meetings between buyers and sellers, when details of the transaction are agreed upon and the new owners take possession. Brokers also must manage their own offices, advertise the properties they list, and handle other business operations. Some combine other types of work such as selling insurance or practicing law with their real estate business.

Salesworkers or agents work for brokers. They show and sell real estate, handle rental properties, and obtain "listings" (owner agreements to place properties for sale with the firm). Because obtaining listings is an important job duty, salesworkers may spend much time on the telephone exploring leads gathered from advertisements and personal contacts. They also answer inquiries about properties over the telephone.

A worker who sells real estate or handles rental properties often must leave the office to call on prospects and drive them to inspect properties for sale. When a number of houses are for sale in a new development, the agent may operate from a model home.

Most real estate salesworkers and brokers sell residential property. A few, usually in large firms, specialize in commercial, industrial, or other types of real estate. Each specialty requires knowledge of that particular type of property. Selling or leasing business property, for example, requires an understanding of

leasing practices, business trends, and location needs. Agents who sell or lease industrial properties must know about transportation, utilities, and labor supply. To sell residential properties, the agent must know the location of schools, churches, shopping facilities, and public transportation. Familiarity with tax rates and insurance coverages also is important.

Places of Employment

Nearly 400,000 persons sold real estate full time in 1974; many others sold on a part-time basis. The number of people licensed to sell totaled about 1.4 million in 1974, according to the National Association of Real Estate License Law Officials.

Most real estate salesworkers work for small establishments; some, particularly in urban areas, work for large firms with several offices. A few sales agents are employed by builders to sell new homes in a particular development. Real estate is sold in all areas, but employment is concentrated in large urban areas and in smaller but rapidly growing communities.

Training, Other Qualifications, and Advancement

Real estate salesworkers and brokers must be licensed in every State and in the District of Columbia. All States require prospective agents to pass written tests. The examination—more comprehensive for brokers than for salesworkers—includes questions on basic real estate transactions and on laws affecting the sale of property. A majority of States require candidates for a broker's license to have a specified amount of experience in selling real estate or the equivalent in related experience or education (generally 1 to 3 years). State licenses usually can be renewed annually without reexamination.

Employers prefer applicants with at least a high school education. As real estate transactions have become more complex, many of the large firms have turned to college graduates to fill sales positions. Most agents have some college training and the number of college graduates has risen substantially in recent years. However, many employers consider personality traits as important as academic training. They look for applicants who possess such positive characteristics as a pleasant personality, honesty, and a neat appearance. Maturity, tact, and enthusiasm for the job are required in order to motivate prospective customers in this keenly competitive field. Agents also should have a good memory for names and faces and business details such as taxes, zoning regulations, and local land-use laws.

Young men and women interested in beginning jobs as real estate salesworkers often apply in their own communities, where their knowledge of local neighborhoods is an advantage. The beginner usually learns the practical aspects of the job under the direction of an experienced agent.

Many firms offer formal training programs for both beginners and experienced salesworkers. About 360 universities, colleges, and junior colleges offer courses in real estate. At some, a student can earn an associate's or bachelor's degree with a major in real estate; several offer advanced degrees. Many local real estate boards that are members of the National Association of Realtors sponsor courses covering the fundamentals and legal aspects of the field. Advanced courses in appraisal, mortgage financing, and property development and management also are available through various National Association affiliates.

Trained and experienced salesworkers can advance in many large firms to sales or general manager. Licensed brokers may open their own offices. Training and experience in estimating property value can lead to work as a real estate appraiser, and people familiar with operating and maintaining rental properties may specialize in property management. Those who gain general experience in real estate, and a thorough knowledge of business conditions and property values in their localities, may enter mortgage financing or real estate counseling.

Employment Outlook

Employment of real estate salesworkers and brokers is expected to rise about as fast as the average for all occupations in order to satisfy a growing demand for housing and other properties. In addition to opportunities that result from this growth, several thousand openings will occur each year as employees die, retire, or leave for other reasons. Replacement needs are high, because a relatively large number of people retire from the real estate business every year. Moreover, many beginners transfer to other work after a short time selling real estate.

The favorable outlook for employment in this field will stem primarily from increased demand for home purchases and rental units. Shifts in the age distribution of the population over the next decade will result in a larger number of young adults with careers and family responsibilities. This is the group that traditionally makes the bulk of home purchases. As their incomes rise, these families also can be expected to purchase larger homes and vacation properties. During periods of declining economic activity and tight credit, the volume of sales and the resulting demand for salesworkers usually declines. During these periods, the number of persons seeking sales positions may outnumber openings. Over the long run, however, the outlook for salespeople is favorable.

Many job opportunities should occur for both college graduates and mature workers transferring from other kinds of saleswork. This field is likely to remain highly competitive and prospects will be best for well-trained, ambitious people who enjoy selling. The proportion of part-time real estate salesworkers may decline, however, as State licensing requirements change and agents need more specialized knowledge to handle real estate transactions.

Earnings and Working Conditions

Commissions on sales are the main source of earnings—very few real estate agents work for a salary. The rate of commission varies according to the type of property and its value; the percentage paid on the sale of farm and commercial properties or unimproved land usually is higher than that paid for selling a home.

Commissions may be divided among several salespersons in a real estate firm. The person who obtains the listing often receives a part when the property is sold; the broker who makes the sale either gets the rest of the commission, or else shares it with the agent who handles the transaction. Although an agent's share varies greatly from one firm to another, often it is about half of the total amount received by the firm.

Earnings of full-time real estate agents generally range between $12,000 and $20,000 a year, according to the limited data available. Beginners usually earn less. Many experienced real estate salesworkers earn $30,000 or more a year. Full-time agents and brokers earn nearly three times as much as average earnings for all nonsupervisory workers in private industry, except farming.

Income usually increases as an agent gains experience, but individual ability, economic conditions, and the type and location of the property also affect earnings. Salesworkers who are active in community organizations and local real estate boards can broaden their contacts and increase their earnings. A beginner's earnings often are irregular because a few weeks or even months may go by without a sale. Although some brokers allow a salesworker a drawing account against future earnings, this practice is not usual with new employees. The beginner, therefore, should have enough money to live on until commissions increase.

Brokers provide office space, but salesworkers generally furnish their own automobiles. Agents and brokers often work in the evenings and during weekends to suit the convenience of customers. Some firms, especially the large ones, furnish group life, health, and accident insurance.

Sources of Additional Information

Details on licensing requirements for real estate salesworkers and brokers are available from most local real estate organizations or from the real estate commission or board located in each State capital. Many States can furnish manuals helpful to applicants who are preparing for the required written examinations.

For more information about opportunities in real estate work, as well as a list of colleges and universities offering courses in this field, contact:

National Association of Realtors, 155 E. Superior St., Chicago, Ill. 60611.

SECURITIES SALESWORKERS

(D.O.T. 251.258)

Nature of the Work

When investors buy or sell stocks, bonds, or shares in mutual funds, they call on securities salesworkers to put the "market machinery" into operation. Both the individual who invests a few hundred dollars and the large institution with millions to invest need such services. Often these workers are called *registered representatives*, *account executives*, or *customers' brokers*.

In initiating buy or sell transactions, securities salesworkers relay orders through their firms' offices to the floor of a securities exchange. When the trade takes place in the over-the-counter market instead, they send the order to the firm's trading department. In either case, the salesworker promptly notifies the customer of the completed transaction and the final price.

In addition, they provide many related services for their customers. They may explain to new investors the meaning of stock market terms and trading practices; offer the client complete financial counseling; devise an individual financial portfolio including securities, life insurance, and other investments for the customer; and advise on the purchase or sale of a particular security. Some individuals may prefer long-term investments designed for either capital growth or income over the years; others might want to make short-term investments which seem likely to rise in price quickly. Securities salesworkers furnish information about the advantages and disadvantages of each type of investment based on each person's objectives. They also supply the latest stock and bond quotations on any security in which the investor is interested, as well as information on the activities and financial positions of the corporations these securities represent.

Securities salesworkers may serve all types of customers or they may specialize in one type only, such as institutional investors. They also may specialize in handling only certain kinds of securities such as mutual funds. Some handle the sale of "new issues," such as corporation securities issued for plant expansion funds.

Beginning securities salesworkers spend much of their time searching for customers. Once they have established a clientele, however, they put more effort into servicing existing accounts and less into seeking new ones.

Places of Employment

About [illegible]00,000 persons—about 10 percent of them women—sold securities full time in 1974. It is estimated that an additional 100,000 persons sold securities less than full time. These include partners and branch office managers in securities firms, insurance agents and brokers offering securities to their customers, and part-time mutual fund representatives.

Securities salesworkers are employed by brokerage firms, investment bankers, and mutual funds in all parts of the country. Many of these firms are very small. Most salesworkers, however, work for a small number of large firms with main offices in big cities (especially in New York) or the approximately 6,000 branch offices in other areas.

Training, Other Qualifications, and Advancement

Because a securities salesworker must be well informed about economic conditions and trends, a college education is increasingly important, especially in the larger securities firms. This is not true, however, for part-time work selling mutual funds. Although employers seldom require specialized training, courses in business administration, economics, and finance are helpful.

Almost all States require persons who sell securities to be licensed. State licensing requirements may include passing an examination and furnishing a personal bond. In addition, salesworkers usually must register as representatives of their firms according to regulations of the securities exchanges where they do business or the National Association of Securities Dealers, Inc. (NASD). Before beginners can qualify as registered representatives, they must pass the Securities and Exchange Commission's (SEC's) General Securities Examination, or examinations prepared by the exchanges or the NASD. These tests measure the prospective representative's knowledge of the securities business. Character investigations also are required. Before securities salesworkers can sell insurance, they must be licensed by the State in which they live.

Most employers provide training to help salesworkers meet the requirements for registration. In member firms of all major exchanges the training period is at least 4 months. Trainees in large firms may receive classroom instruction in security analysis and effective speaking, take courses offered by schools of business and other institutions and associations, and undergo a period of on-the-job training. In small firms, and in mutual funds and insurance companies, training programs may be brief and informal. Beginners read assigned materials and watch other salesworkers transact business.

Many employers consider personality traits as important as academic training. Employers seek applicants who are well groomed, able to motivate people, and ambitious. Because maturity and the ability to work independently also are important, many emexployers prefer to hire those who have

achieved success in other jobs. Successful sales or managerial experience is very helpful to an applicant.

The principal form of advancement for securities salesworkers is an increase in the number and the size of the accounts they handle. Although beginners usually service the accounts of individual investors, eventually they may handle very large accounts such as those of banks and pension funds. Some experienced salesworkers advance to positions as branch office managers, who supervise the work of other salesworkers while executing "buy" and "sell" orders for their own customers. A few representatives may become partners in their firms or do administrative work.

Employment Outlook

The number of securities salesworkers is expected to grow faster than the average for all occupations through the mid-1980's as investment in securities continues to increase. In addition to jobs resulting from growth, several thousand salesworkers will be needed annually to replace those who die, retire, or transfer to other jobs. Replacement needs are relatively large, due to the competitive nature of the occupation. Many salesworkers leave their jobs each year because they are unable to establish a successful clientele.

Employment of securities salesworkers is expected to expand as economic growth and rising personal incomes increase the funds available for investment. The formation of investment clubs, which enable small investors to make minimum monthly payments toward the purchase of securities, also will contribute to the demand for securities salesworkers. Growth in the number of institutional investors will be particularly strong as more people purchase insurance; participate in pension plans; contribute to the endowment funds of colleges and other nonprofit institutions; and deposit their savings in banks. In addition, more workers will be needed to sell securities issued by new and expanding corporations and by State and local governments financing public improvements.

The demand for securities salesworkers fluctuates as the economy expands and contracts. Thus, in an economic downturn, the number of persons seeking jobs may exceed the number of openings—sometimes by a great deal. Over the long-run, however, job opportunities for securities salesworkers are expected to be favorable. During severe slumps in market activity, job prospects and income stability will be greater for salesworkers who are qualified to provide their clients with complete financial services than those who rely strictly on commissions from stock transactions.

Mature individuals with successful work experience should find many job opportunities. Demand will be strongest for well-rounded persons who are willing to learn all aspects of the securities business. Those seeking part-time work will be limited to selling shares in mutual funds.

Earnings and Working Conditions

Trainees usually are paid a salary until they meet licensing and registration requirements. After registration, a few firms continue to pay a salary until the new representative's commissions increase to a stated amount. The salaries paid during training usually range from $800 to $1,000 a month; those working for large securities firms may receive higher salaries.

After candidates are licensed and registered, their earnings depend on commissions from the sale or purchase of stocks and bonds, life insurance, or other securities for customers. Commission earnings are likely to be high when there is much buying and selling, and lower when there is a slump in market activity. Most firms provide salesworkers with a steady income by paying a "draw against commission"—that is, a minimum salary based on the commissions which then can be expected to earn. A few firms pay salesworkers only salary and bonuses, that usually are determined by the volume of company business.

Earnings of full-time, experienced securities salesworkers averaged about $21,000 a year in 1974, according to the limited data available. Many earned more than $30,000 a year. Full-time securities salesworkers earn about three times as much as average earnings for nonsupervisory workers in private industry, except farming.

Securities salesworkers usually work in offices where there is much activity. In large offices, for example, rows of salesworkers sit at desks in front of "quote boards" which continually flash information on the prices of securities transactions. Although established salesworkers usually work the same hours as others in the business community, beginners who are seeking customers may work longer. Some salesworkers accommodate customers by meeting with them in the evenings or on weekends.

Sources of Additional Information

Further information concerning a career as a securities salesworker may be obtained from the personnel departments of individual securities firms.

OCCUPATIONS IN TRANSPORTATION ACTIVITIES

Transportation offers a wide range of career opportunities. Jobs in air, rail, highway, and water transportation vary from those that require many workers who have at least a college degree.

Although this field includes a variety of jobs, most workers drive trucks and buses, fly for airlines, operate trains and ships, or keep this equipment in good working condition. As our economy expands and population grows, demand for freight and passenger service will rise, and more transportation workers will be needed. Employment trends, however, will vary by type of business. Employment in most air and highway transportation jobs will increase, while employment in the merchant marine and many jobs on railroads will decline. Even in most declining occupations, however, new workers will be hired to replace those who retire, die, or transfer to other fields.

Transportation offers excellent opportunities for persons with a college education. Working conditions are generally good and the pay is fairly high. Many employees do a lot of traveling on the job and meet new and interesting people.

AIR TRAFFIC CONTROLLERS

(D.O.T. 193.168)

Nature of the Work

Air traffic controllers are the guardians of the airways. They coordinate flights to prevent accidents and minimize delays in takeoffs and landings. Some regulate airport traffic; others regulate flights between airports.

Airport traffic controllers work in a tower near the runway to keep track of planes that are on the ground and in the air nearby. They radio pilots to give them permission to taxi, take off, or land. To assure safe conditions, they must consider many factors including weather, and the number, size, and speed of the planes in the area. They also must keep track of positions of planes both on the ground and in the air to control several aircraft simultaneously.

After a plane takes off, airport traffic controllers notify enroute controllers to take charge. Route controllers communicate with pilots by radio and use radar and other electronic equipment to help keep planes on course. They also warn pilots about nearby planes and other possible hazards. Each enroute controller is assigned a certain amount of airspace. One, for example, might be responsible for all planes that are 30 to 100 miles north of the airport and flying between 6,000 and 18,000 feet. As the flight progresses, the controller responsible for the aircraft notifies the controller who next will be responsible. Through this coordination, one enroute controller after another takes charge until the plane has safely arrived at its destination and airport traffic controllers are again in charge.

Places of Employment

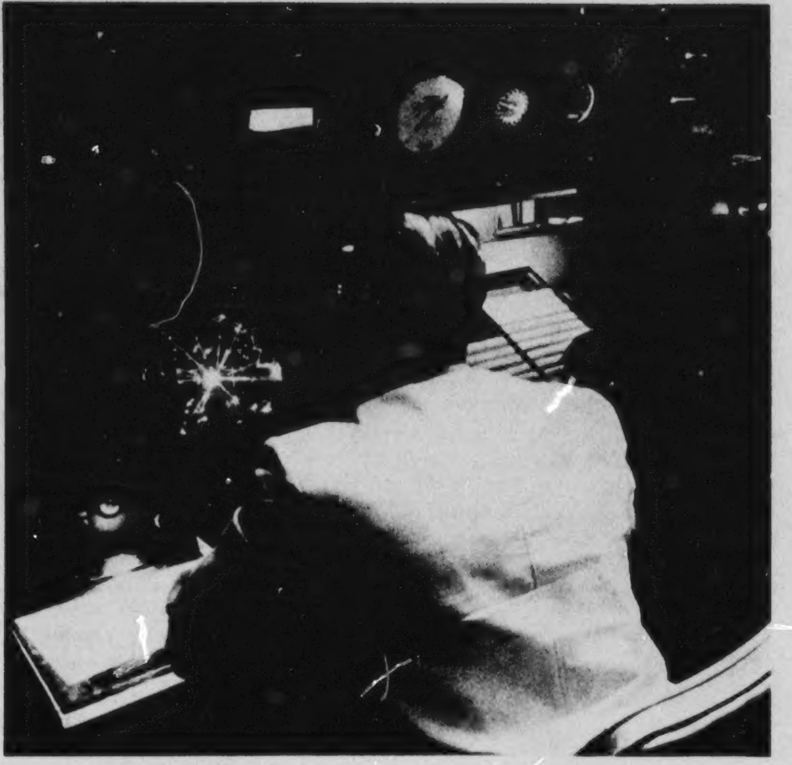
About 22,000 persons worked as air traffic controllers for the Federal Aviation Administration (FAA) in 1974. Almost all worked at major airports and air route traffic control centers located near large cities. A few were assigned to control towers and centers outside the United States.

Training, Other Qualifications, and Advancement

Air traffic controller trainees are selected through the competitive Federal Civil Service System. Applicants must be less than 31 years old and must pass a written test that measures their ability to learn and perform the controller's duties. In addition, applicants must have 3 years of progressively responsible work experience that demonstrates potential for learning and performing air traffic control work, or 4 years of college, or a combination of both. Applicants must be in excellent health, have vision correctable to 20/20, and must be able to speak clearly and precisely.

Successful applicants receive a combination of on-the-job and formal training to learn the fundamentals of the airway system, Federal aviation regulations, controller equipment, and aircraft performance characteristics. All receive intensive training in simulators at the FAA Academy in Oklahoma City. It usually takes 2 to 3 years to become a fully qualified controller. Each year, controllers must pass a physical examination each year; they must pass a job performance examination twice each year.

Controllers can transfer to jobs at different locations and advance to the job of chief controller. Some advance to more responsible management jobs in air traffic con-



Air traffic controllers use radar to follow planes in flight.

trol and a few to top administrative jobs in the FAA.

Employment Outlook

Employment of air traffic controllers is expected to increase at about the same rate as the average for all occupations through the mid-1980's. In addition to openings resulting from growth, many others will arise as experienced controllers retire, die, or transfer to other jobs. Competition for jobs should be keen because the number of qualified applicants is expected to be much greater than the number of openings.

As the number of aircraft increases, the skyways will become more congested. To prevent collisions, the FAA has created spaces, near certain airports and above certain altitudes which require all pilots to receive directions from air traffic controllers. If, as expected, the number and size of these spaces are expanded, more controllers will be needed despite the greater use of new, automated control equipment.

College graduates who have civilian or military experience as controllers, pilots, or navigators, will have the best employment opportunities.

Earnings and Working Conditions

In 1974 controller trainees earned $7,700 or $9,500 a year; the average earnings for all controllers was $21,800 a year, or over twice the average for all nonsupervisory workers in private industry, except farming. Depending on length of service, they receive 13 to 26 days of paid vacation and 13 days of paid sick leave each year, life insurance, health benefits, and a more liberal retirement program than other Federal employees.

Controllers work a basic 40-hour week; however, they may work additional hours for which they receive overtime pay or equal time off. Because control towers and centers must be operated 24 hours a day, 7 days a week, controllers are assigned to night shifts on a rotating basis.

Air traffic controllers work under great stress. They must keep track of several planes at the same time and make certain all pilots receive correct instructions.

Many controllers belong to the Professional Air Traffic Controllers Organization.

Sources of Additional Information

A pamphlet providing general information about controllers and instructions for submitting applications is available from any U.S. Civil Service Commission Job Information Center. Look under U.S. Government, Civil Service Commission, in your telephone book to obtain a local Job Information Center telephone number and call for a copy of Announcement 418. If there is no listing in your telephone book, dial the toll-free number 800-555-1212 and request the toll-free number of the U.S. Civil Service Commission Job Information Center for your location.

AIRPLANE PILOTS

(D.O.T. 196.168, .228, .268, and .283)

Nature of the Work

Pilots are skilled, highly trained professionals who have been carefully selected for their ability to fly safely. They transport passengers and cargo, and perform other tasks such as crop dusting and inspecting power lines. The pilot in command (called captain by the airlines) is in charge of the plane and supervises any other crew members. On larger planes, a copilot assists the pilot in air-to-ground communications, in monitoring flight and engine instruments, and in operating the plane's controls. Most large airliners have a third pilot serving as flight engineer. The flight engineer makes sure the many mechanical and electrical devices aboard the plane work properly.

Pilots must do a great deal of planning before a flight. They confer with a weather forecaster and choose a route, speed, and altitude that will give a safe, smooth flight. The pilot in command then coordinates the route with air traffic control personnel.

Before takeoff, pilots check the engines, controls, instruments, and other components to make sure everything is working properly. If any faulty equipment is located, a mechanic is called to make the repairs. During the flight, they radio to ground control stations to report their plane's altitude, air speed, weather conditions, or other flight details. Pilots steer the plane to each point on the flight plan and change altitude and speed as necessary. In addition, pilots frequently look at instruments to check the amount of fuel and condition of the engines.

If visibility during the flight is poor, pilots must rely completely on instruments. For example, they use the altimeter to fly safely above any mountains or other obstacles. A special navigation radio gives pilots information which, with the help of special maps, tells them exactly where the plane is. During landings in bad weather, airline pilots may use sophisticated landing equipment which provides directions to a point just above the runway. After landing and parking the plane, they go to the airline office and complete flight records required by the company or the Federal Aviation Administration (FAA).

Some specially trained airline pilots are "evaluators" or "check pilots." They fly with each captain at least twice a year to make sure FAA and company regulations are obeyed. Other pilots are instructors and spend much of their time giving flying lessons.

Although pilots employed by businesses usually fly smaller planes than airline pilots, their duties are much alike. These pilots, however, may perform minor maintenance and repair work on their planes.

Before take-off pilots make sure all equipment is working properly.

Places of Employment

About 79,000 civilian pilots worked full-time in 1974. About one-half worked for airline companies; most of the remainder trained student pilots or worked for large corporations that use their own airplanes to transport company executives. Others performed a variety of services for many different employers throughout the country such as flying air taxis or crop dusting planes, inspecting pipelines, or conducting sightseeing trips. Federal, State, and local governments also employed pilots.

Most pilots work at major airports close to cities. Over one-third of all pilots work near Los Angeles, San Francisco, New York, Dallas-Fort Worth, Chicago, Miami, and Atlanta.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have at least a commercial airplane pilot's license from the FAA. To qualify for a commercial pilot's license, applicants must be at least 18 years old and have at least 250 hours of flight experience. They also must pass a strict physical examination to make sure they have 20/20 vision with or without glasses, good hearing, and no physical handicaps that prevent quick reactions. Applicants then must pass a written test covering subjects such as the principles of safe flight, navigation techniques, and FAA regulations. As the final step in getting a commercial license, applicants must demonstrate their flying ability to examiners.

In addition to a commercial license, pilots who fly in bad weather must be licensed by the FAA to fly by instruments. Pilots may qualify for this license after practicing flying by instruments for as least 40 hours, passing a written examination on instrument flying procedures and FAA regulations, and demonstrating their ability to fly by instruments to an examiner.

Licensing requirements for airline captains are different from those for other pilots. Captains must have an airline transport pilot's license as well as an instrument license from the FAA. Applicants must be at least 23 years old and have a minimum of 1,500 hours of flying experience during the previous 8 years, including night and instrument flying.

All licenses remain in effect as long as the pilot can pass the required physical examinations and the periodic tests of flying skills required by government regulations. The airline transport license, however, is not issued to pilots when they reach age 60.

Flying can be learned in military or civilian flying schools. Either kind of training satisfies the flight experience requirements for licensing, but those trained in the armed services may have the added opportunity to gain experience on large aircraft similar to airliners.

Pilots hired by airlines must be high school graduates; however, most airlines require 2 years of college and prefer to hire college graduates. Airline companies use psychological tests to determine an applicant's ability to make quick decisions and accurate judgments under pressure.

New airline pilots usually start as flight engineers. In the past, flight engineers were not required to be pilots. However, since the introduction of jet aircraft, union contracts require all new engineers to be qualified pilots.

Pilots working as flight engineers must obtain a flight engineer's license from the FAA. After several weeks of instruction in simulators and classrooms, they must pass FAA written and flight examinations to qualify for the license. Although airlines favor applicants who already have a flight engineer's license and a commercial pilot's license, they may train those who have only the commercial license.

Companies other than airlines generally require less total flying experience than airlines. However, a commercial pilot's license is usually required and companies prefer applicants with experience in the type of plane they will be flying. New employees generally start as copilots if the planes are less complex than airliners and do not require flight engineers.

Advancement for all new pilots is generally limited to other flying jobs. In the airlines, advancement opportunities usually depend on seniority provisions established by union contracts. After 5 to 10 years, flight engineers advance on the basis of seniority, to co-pilot and, after 10 to 20 years, to captain. In other than airline jobs, copilots may advance to pilot and, in large companies, to chief pilot who is in charge of aircraft scheduling, maintenance, and flight procedures.

Employment Outlook

Employment of pilots is expected to increase faster than the average for all occupations through the mid-1980's. In addition to the jobs from employment growth, openings will result as experienced pilots retire, die, or change occupations. However, competition for job openings should be keen because the number of qualified pilots seeking jobs is expected to exceed the number of openings.

More than half the jobs will occur outside the airlines. Companies are expected to increase the number of planes they operate and the number of pilots they employ to transport executives and cargo to places without scheduled airline service. Additional jobs will result from the need for more flight instructors to train new pilots and to insure that qualified pilots meet FAA proficiency standards.

The expected growth in airline passenger and cargo traffic will create a need for more airliners and more pilots to fly them. However, for the next few years airlines will be able to transport more people by buying bigger planes rather than more planes. Because the number of planes is not expected to increase immediately, opportunities should be limited until the late 1970's when airlines begin increasing the number of planes in operation.

Recent college graduates who have experience flying large, multiengine aircraft and who possess a commercial pilot's license and a flight engineer's license can expect first consideration for jobs with the major airlines. Other companies generally have fewer formal education and experience requirements than airlines. However, these companies prefer applicants with flying experience in the type of plane they will be flying on the job.

Earnings and Working Conditions

Earnings of pilots and copilots are among the highest in the Nation. In 1974, the average salary for all airline pilots was $38,200 a year. Starting salaries for flight engineers ranged from $8,000 to $10,000 a year, while some senior captains on the largest aircraft earned more than $70,000. Based on limited information, earnings of pilots in other than airline companies ranged from $10,000 for copilots on small planes to $40,000 for chief pilots of companies with large jets.

Earnings depend on factors such as the type, size, and speed of the planes, and the number of hours and miles flown. Extra pay is given for night and international flights. As an additional benefit, pilots and their immediate families usually are entitled to a limited amount of reduced fare transportation on their own and other airlines.

Airlines operate flights at all hours of the day and night, so work schedules are often irregular. Under FAA rules airline pilots cannot fly more than 85 hours a month. Most actually fly only about 70 hours a month, and, as a result, they have many work-free days. However, airline pilots may be away from their home bases about one-third of the time or more. When they are away from home, the company provides hotel accommodations and an allowance for expenses.

Although pilots employed outside the airlines are prohibited by FAA regulations from flying more than 100 hours a month, their schedules are irregular and some fly 30 hours while others may fly 90 hours per month. These pilots frequently are responsible for maintaining records or scheduling flights, and do not have as much free time as airline pilots. They also may work irregular hours. Instructors for example, may give lessons on weekends or at night. However, with the exception of pilots who transport executives, most do not remain away from home overnight.

Although flying does not involve much physical effort, the pilot often is subject to mental stress and must be constantly alert and prepared to make decisions quickly.

Most airline pilots are members of the Air Line Pilots Association, International. Those employed by one major airline are members of the Allied Pilots Association.

Sources of Additional Information

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of companies are available in the booklet *The People of the Airlines*. For a copy, write to:

Public Relations Department, Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

For information about the duties, as well as the physical and educational requirements for airline pilots contact:

Air Line Pilots Association, International, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies which operate aircraft at local airports.

To obtain information about jobs with the Federal Aviation Administration, telephone the Federal Job Information Center listed in your local phone book under United States Government, Civil Service Commission. If no center is listed, dial the toll-free number 800-555-1212 and request the toll-free number of the center that serves your area.

MERCHANT MARINE OFFICERS

Nature of the Work

In command of every ocean-going vessel is the *captain* (D.O.T. 197.168) or *master* who is the shipowner's sole representative. The captain has complete authority and responsibility for the ship's operation, including discipline and order, and the safety of the crew, passengers, cargo, and vessel.

While in port, the captain may serve as the shipowner's agent in conferring with custom officials, and in some cases, act as paymaster for the ship. Although not technically members of a specific department, captains generally are associated with the deck department, from whose ranks they have been promoted.

Deck Department. Deck officers or "mates," as they are traditionally called, direct the navigation of the ship and the maintenance of the deck and hull. They maintain the authorized speed and course; plot the vessel's position at frequent intervals; post lookouts; record information in the "log" of the voyage; and immediately notify the captain of any unusual occurrences. Deck officers must be familiar with modern navigational devices, such as sonar and radio directional finders, to operate ships safely and efficiently.

The *chief mate* (D.O.T. 197.133), also known as the first mate or chief officer, is the captain's key assistant in assigning duties to the deck crew and maintaining order and discipline. The chief mate also plans and supervises the loading and unloading of cargo, and assists the captain in taking the ship in and out of port. On some ships, the chief mate also may be in charge of first-aid treatment.

By tradition, the *second mate* (D.O.T. 197.133) is the navigation officer. The second mate sees that the ship is provided with the necessary navigation charts and that navigating equipment is maintained properly.

Third mates (D.O.T. 197.133), the most junior-rated deck officers, are responsible for the care and the maintenance of the navigating bridge and the chartroom. They act

Captain plots vessel's course.

as the signal officer and are in charge of all signaling equipment. They also assist in the supervision of cargo loading and unloading. The third mate frequently inspects lifesaving equipment to be sure it is ready for use in fire, shipwreck, or other emergencies.

Engine Department. Marine engineers operate and maintain all engines and machinery aboard ship. The *chief engineer* (D.O.T. 197.130) supervises the engine department, and is responsible for the efficient operation of engines and other mechanical equipment. The chief engineer oversees the operation of the main powerplant and auxiliary equipment while the vessel is underway and keeps records of equipment performance and fuel consumption.

The *first assistant engineer* (D.O.T. 197.130) supervises engineroom personnel and directs operations such as starting, stopping, and controlling the speed of the main engines. The first assistant engineer also oversees and inspects the lubrication of engines, pumps, generators, and other machinery and, with the aid of the chief engineer, directs all types of repairs.

The *second assistant engineer* (D.O.T. 197.130) has charge of the boiler and associated equipment such as the water-feed system and pumps. The second assistant engineer also makes sure proper steam pressure and oil and water temperatures are maintained and supervises the cleaning of boilers.

The *third assistant engineer* (D.O.T. 197.130) supervises the operation and maintenance of the lubrication system and a variety of other engineroom equipment. Some third assistant engineers are responsible for the electrical and refrigeration systems aboard ships.

Other officers. A ship keeps contact with the shore and other vessels through its *radio officer* (D.O.T. 193.282), who also maintains radio equipment. A passenger ship carries three to six radio officers; the average cargo vessel employs one. These officers send and receive messages by voice or Morse code. They periodically receive and record time signals, weather reports, position reports, and other information. Radio officers also may maintain depth recording equipment and electronic navigation equipment.

Some freighters and all passenger vessels carry *pursers* (D.O.T. 197.168). The purser or staff officer does the extensive paperwork that is required before a ship enters or leaves a port. They prepare payrolls and assist passengers as required. In recent years, the Staff Officers Association has established a program to train pursers to act also as pharmacists' mates. This instruction is designed to improve the medical care aboard freighters and tankers and facilitate U.S. Public Health Service clearance when a ship arrives in port. All passenger ships must carry licensed doctors and nurses.

Places of Employment

Nearly 7,500 officers were employed aboard U.S. oceangoing vessels in late 1974. Deck officers and engineering officers accounted for more than four-fifths of the total, and radio officers made up most of the remainder.

About one-thirds of the officers were aboard freighters and most of the remainder were aboard tankers. Only a small percentage were on passenger vessels.

Training, Other Qualifications, and Advancement

Applicants for an officer's license in the deck or engineering departments of oceangoing vessels must meet certain legal requirements. Captains, chief and second mates, and chief and first assistant engineers must be at least 21 years old. The minimum age for third mates, third assistant engineers, and radio operators is 19. In addition, applicants must present proof of U.S. citizenship and obtain a U.S. Public Health Service certificate attesting to their vision, color perception, and general physical condition.

Besides legal and medical requirements, candidates must also have at least 3 years of appropriate sea experience or be a graduate of an approved training program. Deck officer candidates must pass Coast Guard examinations that require extensive knowledge of navigation, cargo handling, and deck department operations. Marine engineering officer candidates must demonstrate in-depth knowledge of propulsion systems, electricity, plumbing and steam fitting, metal shaping and assembly, and ship structure. To advance to higher ratings, officers must pass progressively more difficult examinations.

For a Coast Guard license as a radio officer, applicants must have a first or second-class radiotelegraph operator's license issued by the Federal Communications Commission. For a license to serve as the sole radio operator aboard a cargo vessel, the Coast Guard also requires 6 months of radio experience at sea.

Unlike most professions, no education requirements have been established for officers. A sailor with 3 years' experience in the deck or engine department may apply for either a third mate's license or for a third assistant engineer's license. However, because of the complex machinery, and navigational and electronic equipment on modern ships, formal training usually is needed to pass the Coast Guard's examination for these licenses.

The fastest and surest way to become a well-trained officer is through an established training program. Such programs are available at the U.S. Merchant Marine Academy at Kings Point, N.Y., and at five State merchant marine academies: California Maritime Academy, Vallejo, Calif.; Maine Maritime Academy, Castine, Maine; Massachusetts Maritime Academy, Hyannis, Mass.; Texas Maritime Academy, Galveston, Tex.; and New York Maritime College, Fort Schuyler, New York, N.Y. About 550 students graduate each year from these schools; about one-half are trained as deck officers and one-half as marine engineers. Admission to the Federal academy is through nomination by a member of Congress, whereas entrance to the other academies is made through written application directly to the school.

Most of the academies offer 4-year programs in nautical science or marine engineering, which include courses such as navigation, mathematics, electronics, propulsion systems, electrical engineering, languages, history, and shipping management, as well as practical experience at sea. After Coast Guard examinations are passed, licenses are issued for either third mate or third assistant engineer. In addition, graduates may receive commissions as ensigns in the U.S. Naval Reserve.

Because of their thorough grounding in theory and its practical application, academy graduates are in the best position to move up to master and chief engineer ratings. Their well-rounded education also helps qualify them for shoreside jobs such as marine superintendent, operating manager, or shipping executive.

Graduates of the U.S. Merchant Marine Academy have an obligation to serve a minimum of 3 years as officers in the merchant marine or in a uniform, of the United States.

A number of trade unions in the maritime industry provide officer training. These unions include the International Organization of Masters, Mates and Pilots; the Seafarers' International Union of North America; the Brotherhood of Marine Officers; and the National Marine Engineers' Beneficial Association. Most union programs are designed to upgrade experienced sailors to officer ratings, although some programs accept inexperienced young persons. For example, the National Marine Engineers' Beneficial Association (MEBA) operates the Calhoon MEBA Engineering School in Baltimore, Md., which offers high school graduates a 3-year apprenticeship training program in preparation for a third assistant engineer's license. The program consists of both classroom instruction and sea experience and provides free room, board, medical care, and text books in addition to a monthly grant. Trainees must agree to serve at least 3 years in the U.S. Merchant Marine after the 3-year training period.

The U.S. Merchant Marine Academy now selects about 10 percent of the approximately 300 persons who enter the academy each year to be trained as "omnicompetent" officers. They are taught both navigational and technical skills so they can work in either the deck or engine department.

Advancement for deck and engine officers is along well-defined lines and depends primarily upon specified sea experience, passing a Coast Guard examination, and leadership ability. Deck officers start as third mates. After 1 year's service they are eligible to take a second mate examination. A second mate may apply for a captain's license after 1 year of service. Officers in the engine department start as third assistant engineers. After 1 year of service, they may apply for a second assistant's license and finally a chief engineer's license.

Employment Outlook

Little change in the employment of ships' officers is anticipated through the mid-1980's because the number of ships in our merchant fleet is not expected to increase significantly. (See introduction on merchant marine occupations.) Nevertheless, many job openings will arise due to the need to replace experienced officers who retire, die, or take shoreside employment. Replacement needs are relatively high because ships' officers are somewhat older, on the average, than workers in other occupations and the liberal pension plans offered by the merchant marine industry encourage early retirement.

Employment opportunities will be best for graduates of maritime academies, particularly the U.S. Merchant Marine Academy. Graduates who cannot find jobs on merchant ships may find jobs in related fields. For example, trained officers are needed on oceanographic research vessels, on vessels that carry supplies to offshore oil drilling rigs, and on dredges operated by the Army Corps of Engineers.

Earnings and Working Conditions

Earnings of officers depend upon their rank and the type of ship. Wages are highest on large ships. The accompanying tabulation shows monthly base wages for officers aboard an average freighter in 1974. Additional payments for overtime or for assuming extra responsibilities generally average about 50 percent of base pay. For example, a second mate with a monthly base pay of $1,159 may regularly earn about $1,739 each month.

	Base pay [1]
Captain	$3.009
Chief engineer	2.734
First assistant engineer	1.635
First mate	1.635
Radio officer	1.225
Second assistant engineer	1.159
Second mate	1.159
Third assistant engineer	1.041
Third mate	1.041
Purser	872

[1] East Coast wages in September, 1974 aboard a 12.000–17.000 power ton single screw ship.

Officers and their dependents enjoy substantial pension and welfare benefits. Vacations range from 90 to 180 days a year. Officers with 20 years of service have the option of a monthly pension of $325 or 37 1/2 percent of their monthly rate of pay. Those who have 25 years of service are eligible for $425 a month or 50 percent of their monthly rate. Officers forced to retire prematurely due to a permanent disability receive partial pensions. Comprehensive medical care and hospitalization are provided for officers and their families through union programs.

The workweek aboard ship is considerably different from the workweek on shore. At sea, most officers are required to stand watch. Watchstanders work 7 days a week. Generally, they work two 4-hour watches (shifts) during every 24-hour period and have 8 hours off between each watch. Some officers are day workers: They work 8 hours a day, Monday through Friday. Both watchstanders and dayworkers are paid overtime for work over 40 hours a week. When the ship is in port, the basic workweek is 40 hours for all crewmembers.

The duties aboard ship are hazardous compared to other industries. At sea, there is always the possibility of injuries from falls or the danger of fire, collision, or sinking.

A number of labor organizations represent merchant marine officers. The two largest are the International Organization of Masters, Mates and Pilots, representing deck officers, and the National Marine Engineers' Beneficial Association, representing engineering officers. The Brotherhood of Marine Officers represents deck and engine officers on some ships. The Staff Officers Association and the Marine Staff Officers Association represents pursers aboard certain freighters. Radio officers are represented by the American Radio Association and the Radio Officers Union. In addition, a number of independent unions organize officers on tankers. Officers' unions may require initiation fees as high as $1,000.

Sources of Additional Information

For general information about merchant marine officer's jobs, write to:

Office of Maritime Manpower, Maritime Administration, U.S. Department of Commerce, Washington, D.C. 20235.

Information about job openings, qualifications for employment, wage scales, and other particulars is available from local maritime officers' unions. If no maritime union is listed in the local telephone directory, contact:

International Organization of Masters, Mates and Pilots, 39 Broadway, New York, N.Y. 10006.

National Marine Engineers' Beneficial Association, 17 Battery Pl., New York, N.Y. 10004.

SCIENTIFIC AND TECHNICAL OCCUPATIONS

Progress in every facet of American life depends to some degree on our scientific and technical work force. An increased standard of living, greater defense capabilities, exploration of outer space, and advancement in atomic energy, health, and communications are just some of the results of the work done by scientists, engineers, and technicians.

About 2.5 million people or nearly one-quarter of all professional workers were engineers, scientists, or other scientific and technical workers in 1974. Employment in these occupations increased much more rapidly than did total employment over the past 25 years; the number of scientists and engineers, for example, almost tripled, while the total number of workers in the United States grew by less than half. The growth of our scientific and technical work force resulted from many factors, including overall economic growth, increased research and development (R&D) expenditures; growth of college and university faculties; the race to put a man on the moon; and the development of sophisticated defense systems. Many technological innovations, such as the widespread use of computers, also contributed to this growth.

Training

A bachelor's degree is usually needed to enter scientific and engineering jobs. However, increasing emphasis is being placed on advanced degrees in some fields, especially in mathematics, physics, and the life sciences. For some occupations, such as astronomers, a doctorate is required for full professional status. A bachelor's degree is sufficient for entry into most engineering jobs, however, and some senior engineering technicians with less than a bachelor's degree are promoted to engineering jobs.

Undergraduate training for scientists and engineers includes courses in their major field and in related science areas, including mathematics. Courses in statistics and computer programming are becoming more important. Students are usually required to take courses in English and a foreign language, as well.

In graduate school, students usually take several courses in their major area of study. Requirements for the master's or doctor's degree vary by institution, but usually include a thesis based on independent research. Students who want to specialize in a particular area of study should select their schools carefully. For example, those who plan to become biomedical engineers and biochemists and work in medicine should study at a university affiliated with a hospital. Those who want to be agricultural scientists can get the most practical training at State universities that have agricultural experiment stations.

Technicians acquire training in many ways. Some complete on-the-job training programs, take formal courses part time while working, or obtain training in the Armed Forces. Many employers, however, seek graduates of specialized training programs. One- to four-year training programs are offered in post-secondary schools—technical institutes, junior and community colleges, area vocational technical schools, and colleges and universities.

Outlook

Opportunities in scientific and technical occupations are expected to expand through the mid-1980's, based on the assumption that additional numbers of engineers, scientists, and technicians will be needed to carry out research and development (R&D) work. In the past, growth in these occupations has been related to increased R&D expenditures, especially by the Federal Government. R&D expenditures of government and industry are expected to continue to increase through the mid-1980's, although more slowly than during the 1960's. If actual R&D levels and patterns differ significantly from those assumed, the outlook in many occupations would be altered.

Scientists, engineers, and other scientific and technical workers will be needed to develop new technologies and better products. In addition, many technically trained people will be required to solve urgent problems such as air, water, and noise pollution, to develop new sources of energy, and to combat disease.

The following sections provide detailed information for 3 conservation occupations, 12 engineering specialties, 13 scientific occupations including life, physical, environmental, and mathematical scientists, and 4 related scientific and technical occupations.

CONSERVATION OCCUPATIONS

Forests, rangelands, wildlife, soil, and water are important natural resources. Conservationists protect, develop, and manage these resources to assure that future needs will be met.

A young person interested in a

career in conservation must have specialized training or experience. Foresters, range managers, and soil conservationists generally need bachelor's degrees in their fields. Technical school or on-the-job training is usually required for other conservation occupations. In addition to technical knowledge and skills, conservationists must have a sincere interest in the environment and the desire to protect it. They should enjoy dealing with others and like public service, since they often work with people in the community. Flexibility is also important, since a conservationist may work in a remote camping area one week, speak to a community group the next, and fight a forest or brush fire the next.

This section describes three conservation occupations—forester, range manager, and soil conservationist.

FORESTERS

(D.O.T. 040.081)

Nature of the Work

Forests are a vital resource. They can be used repeatedly without being destroyed—if properly managed. The condition of our environment has become a major national concern, and foresters play an important role in protecting that environment by ensuring that our forests are properly used. They manage, develop, and protect these lands and their resources—timber, water, wildlife, forage, and recreational areas.

Foresters also do research, provide forestry information to forest owners and to the general public (called extension work), and teach at colleges and universities.

Foresters often specialize in one area of work, such as timber management, outdoor recreation, or forest economics. Some of these areas are recognized as distinct professions.

Places of Employment

About 24,000 persons—most of them men—worked as foresters in 1974. Over one-third worked in private industry, mainly for pulp and paper, lumber, logging, and milling companies. About one-fourth worked for the Federal Government, primarily in the Forest Service of the Department of Agriculture. The remainder worked for State and local governments, colleges and universities, or consulting firms or were self-employed, either as consultants or forest owners.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in forestry is the minimum educational requirement for those desiring professional careers in forestry. An advanced degree is usually required for teaching and research positions.

Education in forestry leading to a bachelor's or higher degree was offered in 1974 by 51 colleges and universities, of which 40 were accredited by the Society of American Foresters. Curriculums stress the liberal arts and communications skills as well as technical forestry subjects. Most programs also include courses in forest economics and business administration to supplement the student's scientific and technical knowledge. Many colleges require students to spend one summer in a field camp operated by the college. All schools encourage summer jobs that give firsthand experience in forest or conservation work.

Forestry graduates often work under the supervision of experienced foresters before advancing to more responsible positions in

Forester instructs forest crew in core sampling procedure.

forest management or research.

In addition to meeting the intellectual demands of forestry work, foresters must have enthusiasm for outdoor work and be physically hardy.

Employment Outlook

As in the past, employment requirements for foresters are expected to grow about as fast as the average for all occupations through the mid-1980's. In recent years, however, the number of degrees in forestry has exceeded occupational requirements, creating competition for jobs. If the number of degrees granted each year remains at present levels, competition is expected to persist throughout the period. Opportunities will be better for those who can offer an employer either an advanced degree or several years' experience.

The country will need more foresters in the future to ensure an increasing output of forest products. Employment also may increase as we become more aware of the need to conserve and replenish our forest resources, and to improve the environmental quality of our forest lands.

Private owners of timberland may well employ more foresters as they recognize the need for—and the higher profitability of—improved forestry and logging practices. The forest products industry will require additional foresters to apply new techniques for using the entire forest crop, to develop methods of growing superior trees in a shorter period of time, and to do research in the fields of plant genetics and fertilization.

Employment of foresters will probably continue to grow faster in private industry than in the Federal Government where budget limitations may restrain growth. State government agencies will probably hire more foresters through Federal-State cooperative programs for fire control, protection against insects and disease, recreation, and technical assistance to owners of forest lands.

The expected rapid increase in the employment of forest technicians will reduce the amount of time spent by professional foresters in performing routine tasks, but the forester will have to devote more and more time to supervisory work and to the general management of the forest.

Earnings and Working Conditions

Foresters starting in private industry in 1974 earned about $9,500 per year, while the median annual salary in private industry was over $16,000.

Graduates entering the Federal Government as foresters in 1974 with just a bachelor's degree started at $8,500 a year. However, because of keen competition, most foresters hired by the Federal Government either held a master's degree or had some experience, and generally started at $10,500 a year. Ph. D.'s generally started at $12,841 or $15,481 a year. The median annual salary in 1974 for federally employed foresters exceeded $18,000.

In local government, foresters generally began at about $9,200 a year, while their median annual salary was $13,750. State governments paid about $8,600 annually to start, and State median salaries were $13,200 per year. College professors generally started at about $9,300 annually, while their median salary was over $18,000 per year. Many faculty foresters supplement their regular salaries with income from lecturing, consulting, and writing.

The forester—especially in beginning jobs—spends considerable time outdoors in all kinds of weather, sometimes in remote areas. Foresters may also work extra hours on emergency duty, as in firefighting or search and rescue missions.

Sources of Additional Information

General information about the forestry profession, lists of reading materials, and lists of schools offering education in forestry are available from:

Society of American Foresters, 1010 16th St. NW., Washington, D.C. 20036.

National Forest Products Association, 1619 Massachusetts Ave., NW., Washington, D.C. 20036.

General career information is also available from:

American Forest Institute, 1619 Massachusetts Ave. NW., Washington, D.C. 20036.

American Forestry Association, 1319 18th St. NW., Washington, D.C. 20036.

For information on forestry careers in the Forest Service, contact:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

RANGE MANAGERS

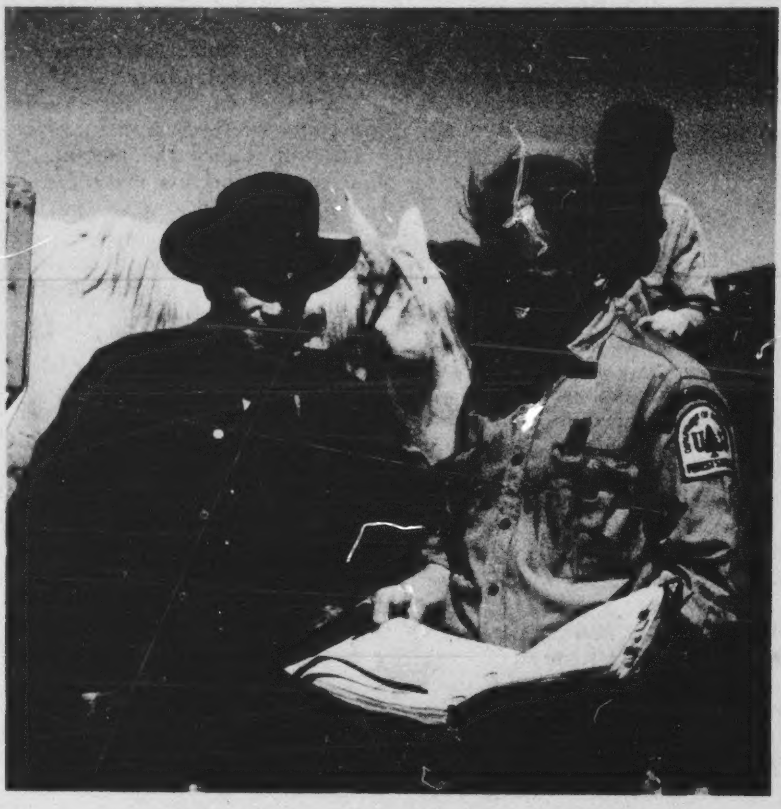
(D.O.T. 040.081)

Nature of Work

Rangelands cover more than 1 billion acres of the United States, mostly in the Western States and Alaska. They contain many natural resources: grass and shrubs for animal grazing, habitats for livestock and wildlife, vast watersheds, facilities for water sports and other kinds of recreation, valuable minerals and energy resources, and areas for scientific study of the environment. These resources can yield their full potential only if properly managed.

Range managers, sometimes called *range conservationists*, *range scientists*, or *range ecologists*, manage, improve, and protect range resources. They determine the number and kind of animals to be grazed, the grazing system to be used, and the best season for grazing in order to yield a high production of livestock. At the same time, they must conserve soil and vegetation for other uses such as wildlife grazing, outdoor recreation, and timber production. Range managers restore or improve rangelands through techniques such as controlled burning, reseeding, and the biological, chemical, or mechanical control of undesirable plants. For example, rangelands with natural sagebrush vegetation may be plowed up and reseeded with a more productive grass. They also determine and carry out range conservation and development needs such as providing for animal watering facilities, erosion control, and fire prevention.

Because of the multiple use of rangelands, range managers often work in such closely related fields as wildlife and watershed management, forest management, and recreation. Some also work on the ecological restoration of areas formerly devoted to mineral extraction. Some range managers teach, conduct research in range management and improvement, and give technical assistance to holders of privately owned grazing lands.



Range manager reviews grazing permit with rancher.

Places of Employment

About 2,500 persons worked as range managers in 1974. Additional numbers were involved in jobs closely allied to range management. The majority worked for Federal, State, and local government agencies. In the Federal Government, most worked in the Forest Service and the Soil Conservation Service of the Department of Agriculture and the Bureau of Land Management of the Department of the Interior. Range managers in State governments are employed in game and fish departments, State land agencies, and extension services.

An increasing number of range managers are working with coal and oil companies to help restore an ecological balance to mined out areas. Some range managers are employed by private ranches, while others work as appraisers for banks and real estate firms.

A few range managers teach and do research at colleges and universities. Others work overseas with United States and United Nations agencies and with foreign governments.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in range management or range conservation is the usual minimum educational requirement for range managers. In the Federal Government, a degree in a closely related field, such as agronomy or forestry, including courses in range management and range conservation, may also be accepted. Graduate degrees are generally required for teaching and research, and may be helpful for advancement in other jobs.

In 1974, 34 colleges and universities belonged to the Range Science Education Council. About half these schools offered full programs leading to degrees in range management or range science. The rest generally offered supplementary range science courses.

A degree in range management requires a basic knowledge of biology, chemistry, physics, mathematics, and communication skills. Specialized courses combine plant, animal, and soil sciences with principles of ecology and resource management. Desirable electives include economics, computer science, forestry, wildlife, and recreation.

Federal Government agencies, primarily the Forest Service, the Soil Conservation Service, and the

Bureau of Land Management, hire some college juniors and seniors for summer jobs in range management. This experience may help them qualify for jobs when they graduate.

Besides having a love for the outdoors, range managers should be able to write and speak effectively and work with others.

Employment Outlook

Employment opportunities for range managers are expected to be good through the mid-1980's. Increasing pressures for an abundant supply of meat and other rangeland animal products should stimulate demand for range managers. Since the amount of rangeland is generally fixed, range managers will be needed to increase the output of rangelands while protecting their ecological balance.

As oil and coal exploration accelerates, and with the exploitation of oil shale fields, private industry will probably require many more range specialists to rehabilitate ecologically disturbed areas.

The use of rangelands for other purposes such as wildlife protection and recreation could create additional needs for range managers. Federal hiring, however, depends heavily upon legislation designed to protect, control, and manage range resources.

Earnings and Working Conditions

In the Federal Government, range managers with the bachelor's degree start at either $8,500 or $10,520, depending on their college grades. Those having 1 or 2 years of graduate work begin at $10,520 or $12,841; persons with Ph. D. degrees start at either $15,481 or $18,463 a year.

Starting salaries for range managers who work for State governments are about the same as those paid by the Federal Government and private corporations. According to limited data, those who work on private ranches earn somewhat lower salaries than persons who work for government agencies. In colleges and universities, Ph. D.'s generally start around $14,000 a year. Range managers in educational institutions sometimes supplement their regular salaries with income from part-time consulting and lecturing and from writing books and articles.

Range managers may spend considerable time away from home working outdoors in remote parts of the range.

Sources of Additional Information

Information about a career as a range manager as well as a list of schools offering training is available from:

Society for Range Management, 2120 S. Birch St., Denver, Colo. 80222.

For information about career opportunities in the Federal Government, contact:

Bureau of Land Management, Denver Service Center, Federal Center Building 50, Denver, Col. 80255.

Forest Service, U.S. Department of Agriculture, 1621 N. Kent St., Arlington, Va. 20415.

Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

SOIL CONSERVATIONISTS

(D.O.T. 040.081)

Nature of the Work

Soil conservationists provide farmers, ranchers, and others with technical assistance in the conservation of soil and water. Farmers and other land managers use this technical assistance in adjusting land use, protecting land against soil deterioration, rebuilding eroded and depleted soils, and stabilizing runoff and sediment-producing areas. They also help improve cover on lands devoted to raising crops, and maintaining forest, pasture, and range land and the wildlife these lands support. They help plan water handling, conserving water for farm and ranch use, reducing damage from flood water and sediment, and draining or irrigating farms or ranches as needed.

The types of technical services provided by soil conservationists are many. They prepare maps which present inventories of soil, water, vegetation, and other details essential in conservation planning and application. They develop information concerning proper methods of land utilization depending on the planned use of the land, for areas varying from field or partial farm or ranch through groups of farms or ranches to entire watersheds. They help estimate relative costs and expected returns of various alternatives of land use and treatment.

After the landowner or operator decides which conservation program to use, the conservationist records the relevant facts as part of a plan. This, together with the maps and other supplemental information, constitutes a plan of action for conservation farming or ranching. The soil conservationist then gives the land manager technical guidance in applying and maintaining these conservation practices.

Where Employed

An estimated 8,500 soil conservationists were employed in 1974, mostly by the Federal Government in the U.S. Department of Agriculture's Soil Conservation Service and the Department of the Interior's Bureau of Indian Affairs. Some are employed by colleges and State and local governments, and others by banks and public utilities.

Training and Advancement

A bachelor of science degree with a major in soil conservation or one of the closely related agricultural or natural resource sciences, such as agronomy, forestry, wildlife biology, regional planning, agricultural education, or agricultural engineering. Study must include 30-semester hours or the equivalent in natural resources or agricultural fields, including the equivalent of 3-semester hours in soils.

Employment Outlook

Employment opportunities for well-trained soil conservationists are good. Opportunities in the profession will expand because public utility companies, banks, and other organizations are becoming interested in conservation and are adding conservationists to their staffs. Some new openings will occur in college teaching at the undergraduate level. In addition, some openings will result because of the normal turnover in personnel.

Earnings

Soil conservationists having a bachelor's degree and employed by the Federal Government received $8,500 a year in late 1974. Advancement to $10,520 could be expected after 1 year of satisfactory service. Further advancement depends upon the individual's ability to accept greater responsibility. Earnings of well-qualified Federal soil conservationists with several years' experience range from $15,481 to $25,581 a year.

Sources of Additional Information

Additional information on employment as a soil conservationist may be obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; Employment Division, Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; or any office of the Department's Soil Conservation Service.

ENGINEERS

The work of engineers affects our lives in thousands of different ways. Their past accomplishments have enabled us to drive safer automobiles, reach the moon, and even prolong life through special machinery. Future accomplishments could help us obtain energy self-sufficiency, develop more pollution-free powerplants and aid medical science's fight against disease.

In 1974, more than 1.1 million persons were employed as engineers, the second largest professional occupation exceeded only by teachers. About 1 percent of all engineers were women. The number of women engineers is expected to increase in the future, since enrollments of women in engineering programs have increased sharply over the past several years.

Most engineers specialize in one of the more than 25 specialties recognized by professional societies. Within the major branches are over 85 subdivisions. Structural, environmental, hydraulic, and highway engineering, for example, are subdivisions of civil engineering. Engineers may also specialize in the engineering problems of one industry, such as motor vehicles, or in a particular field of technology, such as propulsion or guidance systems. Since knowledge of basic engineering principles is required for all areas of engineering, it is possible for engineers to shift from one branch or field of specialization to another, especially during the early stages of their careers. This section, which contains an overall discussion of engineering, is followed by separate statements on 12 branches of the profession—aerospace, agricultural, biomedical, ceramic, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, and petroleum engineering.

Nature of the Work

Engineers develop electric power, water supply, and waste disposal systems to meet the problems of urban living. They design machines and artificial organs which save countless numbers of lives. They design industrial machinery and equipment used to manufacture goods; and heating, air-conditioning, and ventilation equipment for more comfortable living. Engineers also develop scientific equipment to probe outer space and the ocean depths, and design, plan, and supervise the construction of buildings, highways, and rapid transit systems. They design and develop consumer products such as automobiles, television sets, and refrigerators, and systems for control and automation of manufacturing, business, and management processes.

Engineers must consider many factors in developing a new product. For example, in developing new devices to reduce automobile exhaust emissions, engineers must determine the general nature of the device, calculate and test all components, and fit them together in an integrated plan. They must then evaluate the overall effectiveness of the new device, as well as its cost and reliability. These factors are applicable to most products, including those as different as artificial hearts, electronic computers, or industrial machinery.

In addition to design and development, engineers work in testing, production, or operation and maintenance. Still others are in administrative and management jobs where an engineering background is necessary, or in sales where they discuss the technical aspects of a product and assist in planning its installation of use. (See statement on Manufacturers' Salesworkers elsewhere in this book.) Engineers with considerable experience sometimes work as consultants or teach in the engineering schools of colleges and universities.

Engineers within each of the branches may apply their specialized knowledge to many fields. Electrical engineers, for example, work in medicine, computers, missile guidance, or electric power distribution. Because engineering problems are usually complex, the work in some fields cuts across the traditional branches. Using a team approach to solve problems, engineers in one field often work closely with specialists in other scientific, engineering, and business occupations.

Places of Employment

More than half of all engineers work in manufacturing industries—mostly in the electrical equipment, aircraft and parts, machinery, chemicals, scientific instruments, primary metals, fabricated metal products, and motor vehicle industries. Over 330,000 were employed in nonmanufacturing industries in 1974, primarily in construction, public utilities, engineering and architectural services, and business and management consulting services.

Federal, State, and local governments employed more than 150,000 engineers. Over half worked for the Federal Government, mainly in the Departments of Defense, Interior, Agriculture, Transportation, and in the National Aeronautics and Space Administration. Most engineers in State and local government agencies worked in highway and public works departments.

Colleges and universities employed about 43,000 engineers in research and teaching jobs, and a small number worked for nonprofit research organizations.

Engineers are employed in every State, in small and large cities and in rural areas. However, about two-thirds of all engineers in private industry are employed in 10 States, and of these almost one-third are in California, New York, and Pennsylvania. Some branches of engineering are concentrated in particular industries, as discussed in the statements later in this chapter.

Training, Other Qualifications, and Advancement

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates trained in one of the natural sciences or mathematics also may qualify for some beginning jobs. Experienced technicians with some engineering education are sometimes able to advance to engineering jobs.

Graduate training is being emphasized for an increasing number of jobs; it is essential for most beginning teaching and research positions, and desirable for advancement. Some specialties, such as nuclear engineering, are taught mainly at the graduate level.

About 280 colleges and universities offer a bachelor's degree in engineering. Although programs in the larger branches of engineering are offered in most of these institutions, some small specialties are taught in only a very few. Therefore, students desiring specialized training should investigate curriculums before selecting a college. Admissions requirements for undergraduate engineering schools usually include high school courses in advanced mathematics and the physical sciences.

In a typical 4-year curriculum, the first 2 years are spent studying basic sciences—mathematics, physics, chemistry, introductory engineering—and the humanities, social sciences, and English. The last 2 years are devoted, for the most part, to specialized engineering courses. Some programs offer a general engineering curriculum, permitting the student to choose a specialty in graduate school or acquire it on the job.

Some engineering curriculums require more than 4 years to complete. A number of colleges and universities now offer 5-year master's degree programs. In addition, several engineering schools have formal arrangements with liberal arts colleges whereby a student spends 3 years in liberal arts and 2 years in engineering and receives a bachelor's degree from each.

Some schools have 5- or even 6-year cooperative plans where students coordinate classroom study and practical work experience. In addition to gaining useful experience, students can finance part of their education. Because of the need to keep up with rapid advances in technology, engineers often continue their education throughout their careers in programs sponsored by employers, or in colleges and universities after working hours.

All 50 States and the District of Columbia require licensing for engineers whose work may affect life, health, or property, or who offer their services to the public. In 1974, about 350,000 engineers were registered. Generally, registration requirements include a degree from an accredited engineering school, 4 years of relevant work experience, and the passing of a State examination.

Engineering graduates usually begin work under the supervision of experienced engineers. Many companies have special programs to acquaint new engineers with special industrial practices and to determine the specialties for which they are best suited. Experienced engineers may advance to positions of greater responsibility; those with proven ability often become administrators and increasingly larger numbers are being promoted to top executive jobs. Some engineers obtain graduate degrees in business administration to improve their advancement opportunities, while still others obtain law degrees and become patent attorneys.

Engineers should be able to work as part of a team and have creativity, an analytical mind, and a capacity for detail. They should be able to express their ideas well orally and in writing.

Employment Outlook

Employment opportunities for engineers are expected to be good through the mid-1980's. Opportunities for recent graduates of engineering schools are expected to be very good since the number of new graduates is expected to fall short of the number needed to fill the thousands of openings created by employment growth, and the need to replace those who die, retire, or transfer to other occupations. Because of the expected shortage, many openings will be filled by upgraded technicians and college graduates from related fields.

Employment requirements for engineers are expected to grow faster than the average for all occupations through the mid-1980's. Much of this growth will stem from industrial expansion to meet the demand for more goods and services. More engineers will be needed in the design and construction of factories, electric powerplants, office buildings, and transportation systems, as well as in the development and manufacture of more advanced computers, scientific instruments, industrial machinery, chemical products, and motor vehicles.

Many engineers will be required in energy-related activities developing new sources of energy as well as designing energy-saving systems for automobiles, homes, and other buildings. Engineers also will be needed to solve environmental pollution problems.

Defense spending will also affect the outlook for engineers, since a large number work in defense-related activities. The long-range outlook for engineers given here is based on the assumption that defense spending will increase from its 1974 level by the mid-1980's, but will still be somewhat lower than the peak levels of the 1960's. If, however, defense activity differs substantially from the level assumed, the demand for engineers will differ from that now expected.

Since so many factors affect overall employment requirements, opportunities for engineers fluctuate periodically. In the short run, the available engineering jobs can either exceed or fall short of the number of persons looking for jobs, but over the long run, engineers can look forward to good job opportunities.

(The outlook for various branches is discussed in the separate statements later in this section.)

Earnings and Working Conditions

New engineering graduates with a bachelor's degree and no experience were offered average starting salaries of $11,940 a year in private industry in 1974, according to the College Placement Council. Master's degree graduates with no experience averaged almost $13,700 a year; Ph. D. graduates averaged about $18,000. Starting offers for those with the bachelor's degree vary by branch as shown in the accompanying table.

Starting salaries for engineers, by branch, 1973-74

Branch	*Average starting salaries*
Aeronautical engineering......	$11,500
Chemical engineering..........	12,500
Civil engineering................	11,600
Electrical engineering..........	11,800
Industrial engineering..........	11,700
Mechanical engineering........	12,000
Metallurgical engineering.....	12,000

In the Federal Government in late 1974, engineers with a bachelor's degree and no experience could start at $8,500 or $10,520 a year, depending on their college records. Those with a master's degree could start at $10,520 or $12,841. Those having a Ph. D. degree could begin at $15,481 or $18,463. The average salary for experienced engineers in the Federal Government varied by engineering branch, ranging from $20,300 for agricultural engineers to $26,900 for nuclear engineers.

In colleges and universities in 1974, engineers started at about $10,550 a year as instructors, or $13,050 a year as assistant professors for a 9- or 10- month academic year. (See statement on College and University Teachers elsewhere in this book.

Engineers can expect an increase in earnings as they gain experience. According to an Engineering Manpower Commission Survey, the average salary for engineers with 21 to 23 years of experience was $22,900 in 1974. Some in top-level executive positions had much higher earnings.

Many engineers work under quiet conditions in modern offices and research laboratories. Others, however, spend time in more active work—in a factory or mine, at a construction site, or some other outdoor location.

Sources of Additional Information

General information on engineering careers—including student selection and guidance, professional training, and salaries—is available from:

Engineers' Council for Professional Development, 345 E. 47th St., New York, N.Y. 10017.

Engineering Manpower Commission, Engineers Joint Council, 345 E. 47th St., New York, 10017.

National Society of Professional Engineers, 2029 K St. NW., Washington, D.C. 20006.

Information on registration of engineers may be obtained from:

National Council of Engineering Examiners, P.O. Box 752, Clemson, S.C. 29613.

For information about graduate study, contact:

American Society for Engineering Education, One Dupont Circle, Suite 400, Washington, D.C. 20036.

Societies representing the individual branches of the engineering profession are listed later in this chapter. Each can provide information about careers in the particular branch. Many other engineering organizations are listed in the following publications available in most libraries or from the publisher:

Directory of Engineering Societies, published by Engineers Joint Council, 345 E. 47th St., New York, N.Y. 10017.

Scientific and Technical Societies of the United States and Canada, published by the National Academy of Sciences, National Research Council.

Some engineers are members of labor unions. Information on engineering unions is available from:

International Federation of Professional and Technical Engineers, 1126 16th St. NW., Washington, D.C. 20036.

AEROSPACE ENGINEERS

(D.O.T. 002.081)

Nature of the Work

Aerospace engineers play a vital role in America's defense and space activities. They work on all types of aircraft and spacecraft including missiles, rockets, and military and commercial planes. They develop aerospace products from initial planning and design to final assembly and testing.

Aerospace engineers generally specialize in an area of work like structural design, navigational guidance and control, instrumentation and communication, or production methods. They also may specialize in one type of aerospace product such as passenger planes, launch vehicles, satellites, manned space capsules, or landing modules.

Places of Employment

About 52,000 aerospace engineers were employed in 1974, mainly in the aircraft and parts industry. Some worked for Federal Government agencies, primarily the National Aeronautics and Space Administration and the Department of Defense. A few worked for commercial airlines, consulting firms, and colleges and universities.

Employment Outlook

Employment of aerospace engineers is expected to rise above recent levels by the mid-1980's. Employment of aerospace engineers is largely determined by the level of Federal expenditures on defense and space programs: in the past, rapid changes in spending levels have usually been accompanied by sharp employment fluctuations. Expenditures for the space program are expected to increase only slightly from 1974 to the mid-1980's, while defense spending will probably increase moderately. Although neither defense nor space expenditures are expected to reach their peak levels of the 1960's, many additional workers will be required to fill openings created by growth of the aerospace industry and by deaths, retirements, and transfers. (See introductory section of this chapter for discussion of training requirements and earnings.)

Sources of Additional Information

American Institute of Aeronautics and Astronautics, Inc., 1290 Avenue of the Americas, New York, N.Y. 10019.

AGRICULTURAL ENGINEERS

(D.O.T. 013.081)

Nature of the Work

Agricultural engineers develop machinery, equipment, and methods to improve efficiency in the production, processing, and distribution of food and other agricultural products. They design farm machinery, equipment, and structures, and develop methods for utilizing electrical energy on farms and in food and feed processing plants. Agricultural engineers also are concerned with the conservation and management of soil and water resources. They work in research and development, production, sales, or management.

Places of Employment

Most of the 12,000 agricultural engineers employed in 1974 worked for manufacturers of farm and household equipment, electric utility companies, and distributors of farm equipment and supplies. Some worked for engineering consultants who supply services to farmers and farm-related industries; others were independent consultants.

The Federal Government employs about 600 agricultural engineers in the Soil Conservation Service and Agricultural Research Service of the Department of Agriculture. Some are employed by colleges and universities, and a few are employed by State and local governments.

Employment Outlook

Employment of agricultural engineers is expected to grow faster than the average for all occupations through the mid-1980's. Increasing demand for agricultural products, modernization of farm operations, increasing emphasis on conservation of resources, and the use of agricultural products and wastes as industrial raw materials should provide opportunities for additional engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, Mich. 49085.

BIOMEDICAL ENGINEERS

Nature of the Work

Biomedical engineers use engineering principles to solve medical and health-related problems. Many do research, along with life scientists, chemists, and members of the medical profession, on the engineering aspects of the biological systems of man and animals. Some design and develop medical instruments and devices including artificial hearts and kidneys, lasers for surgery, and pacemakers that regulate the heartbeat. Other biomedical engineers adapt computers to medical science, and design and build systems to modernize laboratory, hospital, and clinical procedures. Most engineers in this field require a sound background in one of the major engineering disciplines (mechanical, electrical or chemical) in addition to specialized biomedical training.

Places of Employment

There were 3,000 biomedical engineers in 1974. Most teach and do research in colleges and universities. Some work for the Federal Government, primarily in the National Aeronautics and Space Administration, or in State agencies. An increasing number work in private industry developing new devices, techniques, and systems for improving health care. Some work in sales positions.

Employment Outlook

Employment of biomedical engineers is expected to grow faster than the average for all occupations through the mid-1980's, but the actual number of openings is not likely to be very large. Those who have master's and Ph. D. degrees will be in strong demand to teach and to fill jobs resulting from increased expenditures for medical research. Increased research funds could also create new positions in instrumentation and systems for the delivery of health services. (See introductory part of this chapter for information on training requirements and earnings.)

Sources of Additional Information

Alliance for Engineering in Medicine and Biology, 3900 Wisconsin Ave. NW., Suite 300, Washington, D.C. 20016.

Biomedical Engineering Society, P.O. Box 2399, Culver City, Calif. 90230.

Foundation for Medical Technology, Mt. Sinai Medical Center, 100 St., 5th Ave., New York, N.Y. 10029.

CERAMIC ENGINEERS

(D.O.T. 006.081)

Nature of the Work

Ceramic engineers develop methods for processing ceramic materials into useful products. Although to some, the word ceramics means pottery, ceramics actually include a wide range of products with thousands of uses. Ceramics include all non-metallic, inorganic materials which require the use of high temperature in their processing. Thus, ceramic engineers work on diverse products such as glassware, heat-resisting materials for missile nose cones, electronic components and materials used in medical devices, and nuclear reactors. They also design and supervise the construction of plants and equipment to manufacture these products.

Ceramic engineers generally specialize in one or more products—for example, products of refractories (fire-and heat-resistant materials such as firebrick); whitewares (porcelain and china dinnerware or high voltage electrical insulators); structural materials (such as brick tile, and terra cotta); electronic ceramics (ferrites for memory systems and microwave devices); protective and refractory coatings for metals; glass; abrasives; cements technology; or fuel elements for atomic energy.

Places of Employment

About 12,000 ceramic engineers were employed in 1974, mostly in the stone, clay, and glass industries. Others work in industries that produce or use ceramic products such as the iron and steel, electrical equipment, aerospace, and chemicals industries. Some are in colleges and universities, independent research organizations, and the Federal Government.

Employment Outlook

Employment of ceramic engineers is expected to grow faster than the average for all occupations through the mid-1980's.

Programs related to nuclear energy, electronics, defense, and medical science will provide job opportunities for ceramic engineers. Additional ceramic engineers will be required to improve and adapt traditional ceramic products, such as whitewares and abrasives, to new uses. The development of filters and catalytic surfaces to reduce pollution, and the development of ceramic materials for energy conversion and conservation should create additional openings for ceramic engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Ceramic Society, 65 Ceramic Dr., Columbus, Ohio 43214.

CHEMICAL ENGINEERS

(D.O.T. 008.081)

Nature of the Work

Chemical engineers are involved in many phases of the production of chemicals and chemical products. They design equipment and chemical plants as well as determine methods of manufacturing the product. Often, they design and operate pilot plants to test their work and develop chemical processes such as those for removing chemical contaminants from waste materials. Because the duties of chemical engineers cut across many fields, these professionals must have a working knowledge of chemistry, physics, and mechanical and electrical engineering.

This branch of engineering is so diversified and complex that chemical engineers frequently specialize in a particular operation such as oxidation or polymerization. Others specialize in a particular area such as environmental control or in the production of a specific product like plastics or rubber.

Places of Employment

Most of the 50,000 chemical engineers working in 1974 were in manufacturing industries, primarily those producing chemicals, petroleum, and related products. Some worked in government agencies or taught and did research in colleges and universities. A small number worked for independent research institutes and engineering consulting firms, or as independent consulting engineers.

Chemical engineer checks production instructions on chemical plant.

Employment Outlook

Employment of chemical engineers is expected to grow faster than the average for all occupations through the mid-1980's. A major factor underlying this growth is industry expansion—the chemicals industry in particular.

The growing complexity and automation of chemical processes will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Chemical engineers also will be needed in solving problems of environmental protection, synthetic food processing, and in the design and development of nuclear reactors. In addition, development of new chemicals used in the manufacture of consumer goods, such as plastics and man-made fibers, probably will create additional openings. (See introductory part of this section for information on training requirements and earnings. See also the statement on Chemists elsewhere in this book.)

Sources of Additional Information

American Institute of Chemical Engineers,
345 East 47th St., New York, N.Y.
10017.

CIVIL ENGINEERS

(D.O.T. 005.081)

Nature of the Work

Civil engineering is one of the oldest branches of the profession. Civil engineers design and supervise the construction of roads, harbors, airports, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental (sanitary), transportation (including highways and railways), geotechnical and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from site supervisor of a construction project or city engineer to top-level executive. Others teach in colleges and universities or work as consultants.

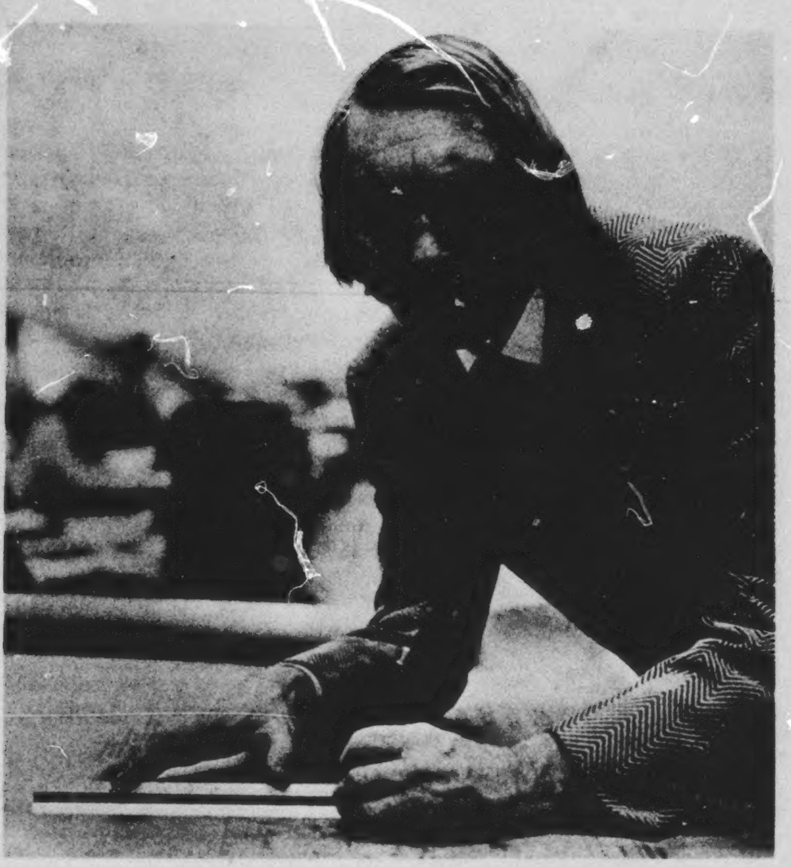
Places of Employment

Nearly 170,000 civil engineers were employed in 1974. Most work for Federal, State, and local government agencies or in the construction industry. Many work for consulting engineering and architectural firms or as independent consulting engineers. Others work for public utilities, railroads, educational institutions, and manufacturing industries.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They often work at construction sites, sometimes in remote areas or in foreign countries. In some jobs, they must often move from place to place to work on different projects.

Employment Outlook

Employment of civil engineers is expected to increase faster than the average for all occupations through the mid-1980's. Job opportunities



Civil engineers design a variety of projects such as roads, bridges, and air fields.

will result from the growing needs for housing, industrial buildings, electric power generating plants, and transportation systems created by an increasing population and an expanding economy. Work related to solving problems of environmental pollution and energy self-sufficiency will also require additional civil engineers. Increasing development of offshore drilling facilities will create additional openings for civil engineers in this specialized area.

Many civil engineers also will be needed each year to replace those who retire or die. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Society of Civil Engineers, 345 E.
47th St., New York, N.Y. 10017.

ELECTRICAL ENGINEERS

(D.O.T. 003.081, .151, and .187)

Nature of the Work

Electrical engineers design, develop, and supervise the manufacture of electrical and electronic equipment. These include electric motors and generators; communications equipment; electronic equipment such as heart pacemakers, pollution measuring instrumentation, radar, computers, lasers and missile guidance systems; and electrical appliances of all kinds. They also design and operate facilities for generating and distributing electric power.

Electrical engineers generally specialize in a major area of work such as electronics, computers, electrical equipment manufacturing, communications, or power. Others specialize in subdivisions of these broad areas like microwaves or missile guidance and tracking systems. Many are engaged in research, development, and design activities. Some are in administrative and management jobs; others work in manufacturing operations, in technical sales, or in college teaching.

Places of Employment

Electrical engineering is the largest branch of the profession. Nearly 290,000 electrical engineers were employed in 1974, mainly by manufacturers of electrical and electronic equipment, aircraft and parts, business machines, and professional and scientific equipment. Many work for telephone, telegraph, and electric light and power companies. Large numbers are employed by government agencies and by colleges and universities. Others work for construction firms, for engineering consultants, or as independent consulting engineers.

Employment Outlook

Employment of electrical engineers is expected to increase faster than the average for all occupations through the mid-1980's. Increased demand for products such as computers, communications and electric power generating equipment, and military electronics is expected to be the major factor contributing to this growth. The demand for electrical and electronic consumer goods, along with increased research and development in nuclear power generation, should create additional jobs for electrical engineers. Many electrical engineers also will be needed to replace personnel who retire, die, or transfer to other fields of work.

The long-range outlook for electrical engineers is based on the assumption that defense spending in the mid-1980's will increase from the 1974 level, but will still be somewhat lower than the peak level of the late 1960's. If defense activity should differ substantially from the projected level, the demand for electrical engineers will differ from that now expected.

(See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

Institute of Electrical and Electronic Engineers, 345 East 47th St., New York, N.Y. 10017.

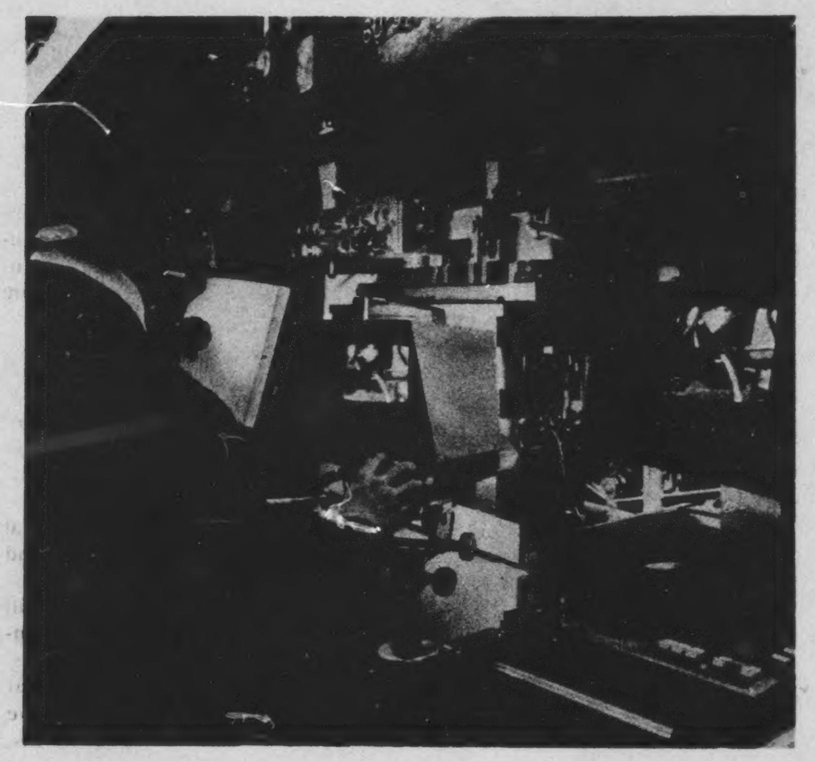
INDUSTRIAL ENGINEERS

(D.O.T. 012.081, .168, and .188)

Nature of the Work

Industrial engineers determine the most effective ways for an organization to use the basic factors of production—personnel, machines, and materials. They are more concerned with people and methods of business organization, than are engineers in other specialties who generally are concerned more with particular products or processes, such as metals, or power and mechanics.

Industrial engineers design systems for data processing and apply operations research techniques to organizational, production, and related problems. They also develop management control systems to aid in financial planning and cost analysis, design production planning and control systems to coordinate activities and control product quality, and design or improve systems for the physical distribution of goods and services. Other activities include plant location surveys, where they must consider sources of raw materials, transportation, and taxes, and the development of wage and salary administration concepts and job evaluation programs.



Industrial engineer reviews film of production process to check for problems.

Places of Employment

About 180,000 industrial engineers were employed in 1974; more than two-thirds worked in manufacturing industries. Because their skills can be used in almost any type of company, they are more widely distributed among industries than are those in other branches of engineering. For example, some work for insurance companies, banks, construction and mining firms, and public utilities. Hospitals, retail organizations, and other large business firms employ industrial engineers to improve operating efficiency. Still others work for government agencies and colleges and universities. A few are independent consulting engineers.

Employment Outlook

Employment of industrial engineers is expected to grow faster than the average for all occupations through the mid-1980's. The increasing complexity of industrial operations and the expansion of automated processes, along with industry growth, are factors contributing to employment growth. Increased recognition of the importance of scientific management and safety engineering in reducing costs and increasing productivity, and the need to solve problems of environmental pollution, should create additional opportunities.

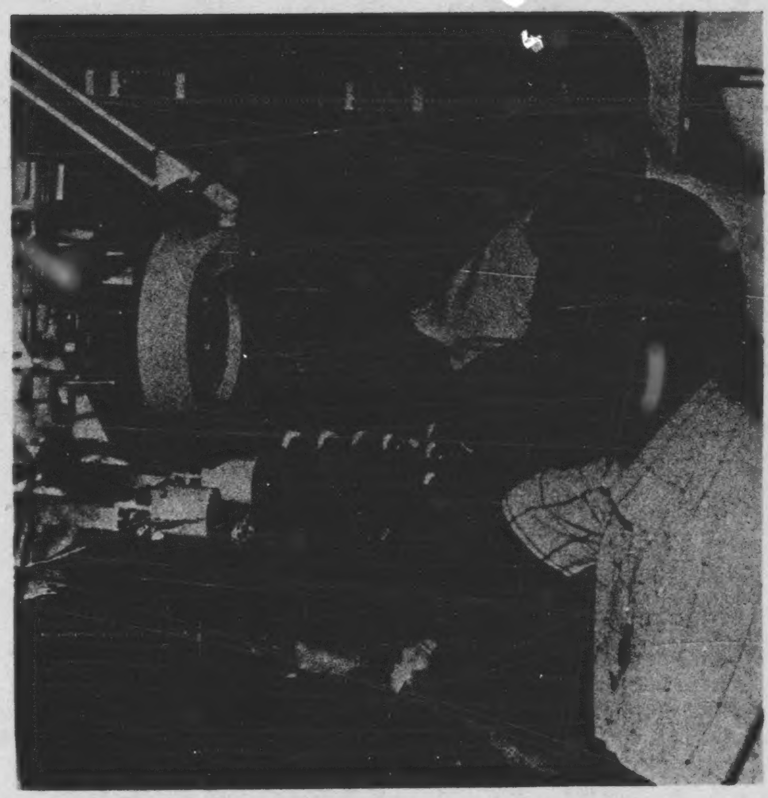
Additional numbers of industrial engineers will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Institute of Industrial Engineers, Inc., 25 Technology Park, Atlanta, Norcross, Ga. 30071.

MECHANICAL ENGINEERS

(D.O.T. 007.081, .151, .168, and .187)



Mechanical engineers test a mockup of equipment.

Nature of the Work

Mechanical engineers are concerned with the production, transmission, and use of power. They design and develop machines that produce power, such as internal combustion engines, steam and gas turbines, jet and rocket engines, and nuclear reactors. They also design and develop a great variety of machines that use power—refrigeration and air-conditioning equipment, elevators, machine tools, printing presses, steel rolling mills, and many others.

Many specialized areas of work have developed within this field and, since mechanical engineers are employed in nearly all industries, their work varies with the industry and the function performed. Among these specialties are motor vehicles, marine equipment, steampower, heating, ventilating and air-conditioning, instrumentation, and machines for specialized industries, such as petroleum, rubber and plastics, and construction.

Large numbers of mechanical engineers do research, test, and design work. Many are administrators or managers, while others work in maintenance, technical sales, and production operations. Some teach in colleges and universities or work as consultants.

Places of Employment

About 185,000 mechanical engineers were employed in 1974. Almost three-fourths were employed in manufacturing—mainly in the primary and fabricated metals, machinery, transportation equipment, and electrical equipment industries. Others work for government agencies, educational institutions, and consulting engineering firms.

Employment Outlook

Employment of mechanical engineers is expected to increase faster than the average for all occupations through the mid-1980's. The growing demand for industrial machinery and machine tools and the increasing complexity of industrial machinery and processes will be major factors supporting increased employment opportunities. Growing demand for nuclear power, as well as the need to solve environmental pollution problems, will also contribute to employment growth.

Large numbers of mechanical engineers also will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

The American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.

METALLURGICAL ENGINEERS

(D.O.T. 011.081)

Nature of the Work

Metallurgical engineers, increasingly referred to as materials engineers, develop methods to process and convert metals into useful products. These engineers generally work in one of the three main branches of metallurgy—extractive or chemical, physical, and mechanical. Extractive metallurgists are concerned with extracting metals from ores, and refining and alloying them to obtain useful metal. Physical metallurgists deal with the nature, structure, and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgists develop methods to work and shape metals such as casting, forging, rolling, and drawing. Scientists working in this field are known as metallurgists or materials scientists, but the distinction between scientists and engineers is small.

Places of Employment

The metalworking industries—primarily the iron and steel and nonferrous metals industries—employed over one-half of the estimated 17,000 metallurgical and materials engineers in 1974. Metallurgical engineers also work in industries that manufacture machinery, electrical equipment, and aircraft and parts, and in the mining industry. Some work for government agencies and colleges and universities.

Employment Outlook

Employment of metallurgical and materials engineers is expected to grow about as fast as the average for all occupations through the mid-1980's. An increasing number of these engineers will be needed by the metalworking industries to develop new metals and alloys as well as to adapt current ones to new needs. For example, communications equipment, computers, and spacecraft require lightweight metals of high purity. Metallurgical engineers also will be needed to solve problems associated with the efficient use of nuclear energy. As the supply of high-grade ores diminishes, more metallurgical engineers will be required to develop new ways of recycling solid waste materials in addition to processing low-grade ores now regarded as unprofitable to mine. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 345 E. 47th St., New York, N.Y. 10017.

American Society for Metals, Metals Park, Ohio 44073.

Metallurgical engineers use scientific equipment to study the structural make-up of materials.

MINING ENGINEERS

(D.O.T. 010.081 and .187)

Nature of the Work

Mining engineers find, extract, and prepare minerals for manufacturing industries to use. They design the layouts of mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the efficient operation of mines and mine safety, including ventilation, water supply, power, communications, and equipment maintenance. Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment and devise improved methods to process extracted minerals. Mining engineers frequently specialize in the extraction of specific metal ores, coal, and other nonmetallic minerals.

With increased emphasis on protecting the environment, many mining engineers have been working to solve problems related to mined-land reclamation and water and air pollution.

Places of Employment

About 5,000 mining engineers were employed in 1974. Most work in the mining industry. Some work for firms that produce equipment for the mining industry, while others work in colleges and universities, in government agencies, or as independent consultants.

Mining engineers are usually employed at the location of mineral deposits, often near small communities. However, those in research, teaching, management, consulting, or sales are often located in large metropolitan areas.

Employment Outlook

Employment of mining engineers is expected to increase through the mid-1980's. Efforts to attain energy self-sufficiency should spur the demand for coal, and therefore for mining engineers in the coal industry. The increase in demand for coal will depend, to a great extent, on the availability and price of other domestic energy sources such as petroleum, natural gas, and nuclear energy. More technologically advanced mining systems and further enforcement of mine health and safety regulations will also increase the need for mining engineers. In addition, exploration for all other minerals is also increasing. Easily mined deposits are being depleted, creating a need for engineers to devise more efficient methods for mining low-grade ores. Employment opportunities also will arise as new alloys and new uses for metals increase the demand for less widely used ores. Recovery of metals from the sea and the development of recently discovered oil shale deposits could present major challenges to the mining engineer. (See introductory part of this section for information on training requirements and earnings.)

Mining engineers discuss proper roof control methods with miners.

Sources of Additional Information

The Society of Mining Engineers of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 345 E. 47th St., New York, N.Y. 10017.

PETROLEUM ENGINEERS

(D.O.T. 010.081)

Nature of the Work

Petroleum engineers are mainly involved in drilling for and producing oil and gas. They work to achieve the maximum profitable

Petroleum engineer examines a cross section plot of a petroleum reservoir.

recovery of oil and gas from a petroleum reservoir by determining and developing the best and most efficient drilling methods.

Since only a small proportion of the oil and gas in a reservoir will flow out under natural forces, petroleum engineers develop and use various artificial recovery methods such as flooding the oil field with water to force the oil to the surface. Even when using the best recovery methods, about half the oil is still left in the ground. Petroleum engineers' research and development efforts to increase the proportion of oil recovered in each reservoir can make a significant contribution to increasing available energy resources.

Places of Employment

Over 12,000 petroleum engineers were employed in 1974, mostly in the petroleum industry and closely allied fields. Their employers include not only the major oil companies, but also the thousands of smaller independent oil exploration and production companies. They also work for companies that produce drilling equipment and supplies. Some petroleum engineers work in banks and other financial institutions, which need their knowledge of the economic value of oil and gas properties. A small number work for engineering consulting firms or as independent consulting engineers, and for Federal and State governments.

The petroleum engineer's work is concentrated in places where oil and gas is found. Almost three-fourths of all petroleum engineers are employed in the oil producing States of Texas, Oklahoma, Louisiana, and California. There are many American petroleum engineers working overseas in oil producing countries.

Employment Outlook

The employment of petroleum engineers is expected to grow faster than the average for all occupations through the mid-1980's. Economic expansion will require increasing supplies of petroleum and natural gas, even with energy conservation measures. With efforts to attain energy self-sufficiency, and high petroleum prices, increasingly sophisticated and expensive recovery methods will be used. Also, new sources of oil such as oil shale and new offshore oil sources may be developed. All of these factors will contribute to increasing demand for petroleum engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

Society of Petroleum Engineers of AIME,
6200 North Central Expressway, Dallas,
Tex. 75206.

ENVIRONMENTAL SCIENTISTS

Environmental scientists help us understand our physical environment. They play an important role in solving environmental pollution problems. These scientists, sometimes known as earth scientists, are concerned with the history, composition, and characteristics of the earth's surface, interior, and atmosphere. Some do basic research to increase scientific knowledge, while others do applied research and use knowledge gained from basic research to help solve practical problems. Geologists, for example, explore for new sources of oil, other fuels, and ores. Most meteorologists forecast the weather. Many environmental scientists teach in colleges and universities.

This chapter discusses four environmental science occupations—geologists, geophyscists, meteorologists, and oceanographers.

GEOLOGISTS

(D.O.T. 024.081)

Nature of the Work

Geologists study the structure, composition, and history of the earth's crust in order to locate natural resources, give warnings of natural disasters, and insure that buildings are constructed on firm foundations. By examining surface rocks and drilling to recover rock cores, they determine the distribution, thickness, and slope of the rocks beneath the earth's surface. They also identify rocks and minerals, conduct geological surveys, draw maps, take measurements, and record data.

Geologists use many tools and instruments such as hammers, chisels, levels, transits (mounted telescopes used to measure angles), gravity meters, cameras, compasses, and seismographs (instruments that record the intensity and duration of earthquakes and earth tremors). They may evaluate information from photographs taken from aircraft and satellites and use computers to record and analyze data.

Geologists may also work in laboratories where they examine the chemical and physical properties of specimens under controlled temperature and pressure. They may study fossil remains of animal and vegetable life or experiment with the flow of water and oil through rocks. Laboratory equipment used by geologists includes complex instruments such as the X-ray diffractometer, which determines the structure of minerals, and the petrographic microscope for close study of rock formations.

Besides locating resources and working in laboratories, geologists are also called on to advise construction companies and governmental agencies on the suitability of certain locations for constructing buildings, dams, or highways. Some geologists administer and manage research and exploration programs. Others teach and work on research projects in colleges and universities.

Geologists usually specialize in one or a combination of three general areas—earth materials, earth processes, and earth history.

Economic geologists locate earth materials such as minerals and solid fuels. *Petroleum geologists* search for and recover oil and natural gas. Some petroleum geologists work near drilling sites and others correlate petroleum related geologic information for entire regions. *Engineering geologists* determine suitable sites for the construction of roads, airfields, tunnels, dams, and other structures. They decide, for example, whether underground rocks will bear the weight of a building or whether a proposed structure may be in an eearthquake prone-area. *Mineralogists* analyze and classify minerals and precious stones according to composition and structure. *Geochemists* study the chemical composition and changes in minerals and rocks to understand the distribution and migration of elements in the earth's crust.

Geologists concerned with earth processes study landforms and their rock masses, sedimentary deposits (matter deposited by water or wind) and eruptive forces such as volcanoes. *Volcanologists* study active and inactive volcanoes, and lava flows and other eruptive activity. *Geomorphologists* examine landforms and those forces, such as erosion and glaciation, which cause them to change.

Other geologists are primarily concerned with earth history. *Paleontologists* study plant and animal fossils to trace the evolution and development of past life. *Geochronologists* determine the age of rocks and landforms by the radioactive decay of their elements. *Stratigraphers* study the distribution and arrangement of sedimentary rock layers by examining their fossil and mineral content.

Many geologists specialize in new fields that require knowledge of another science as well. *Astrogeologists* study geological conditions on other planets. *Geological oceanographers* study the sedimentary and other rock on the ocean floor and continental shelf. (See statements on Oceanographers and Mining elsewhere in this book.)

Places of Employment

More than 23,000 people worked as geologists in 1974, approximately 10 percent of them women. Almost three-fifths of all geologists work in private industry. Most industrial geologists work for petroleum companies. Geologists also work for mining and quarrying companies. Some are employed by construction firms. Others are independent consultants to industry and government.

The Federal Government employs over 1,600 geologists. Two-thirds work for the Department of the Interior in the U.S. Geological Survey, the Bureau of Mines, and the Bureau of Reclamation. State agencies also employ geologists, some working on surveys in cooperation with the U.S. Geological Survey.

Colleges and universities employ almost 7,500 geologists. Some work for nonprofit research institutions and museums.

Employment of geologists is concentrated in those States with large oil and mineral deposits. Almost two-thirds work in five States: Texas, California, Louisiana, Colorado, and Oklahoma. Some are employed by American firms overseas for varying periods of time.

Training, Qualifications, and Advancement

A bachelor's degree in geology or a related field is adequate for entry into many geology jobs. An advanced degree is helpful for advancement in most types of work, and is essential for college teaching and some research positions.

About 300 colleges and universities offer a bachelor's degree in geology. Undergraduate students devote about one-fourth of their time to geology courses, including historical geology, structural geology, mineralogy, petrology, and invertebrate paleontology. Students spend about one-third of their time taking mathematics, related sciences—such as physics and chemistry—and engineering; they spend the remainder on general academic subjects.

More than 160 universities award advanced degrees in geology. Graduate students take advanced courses in geology and specialize in one branch of the science.

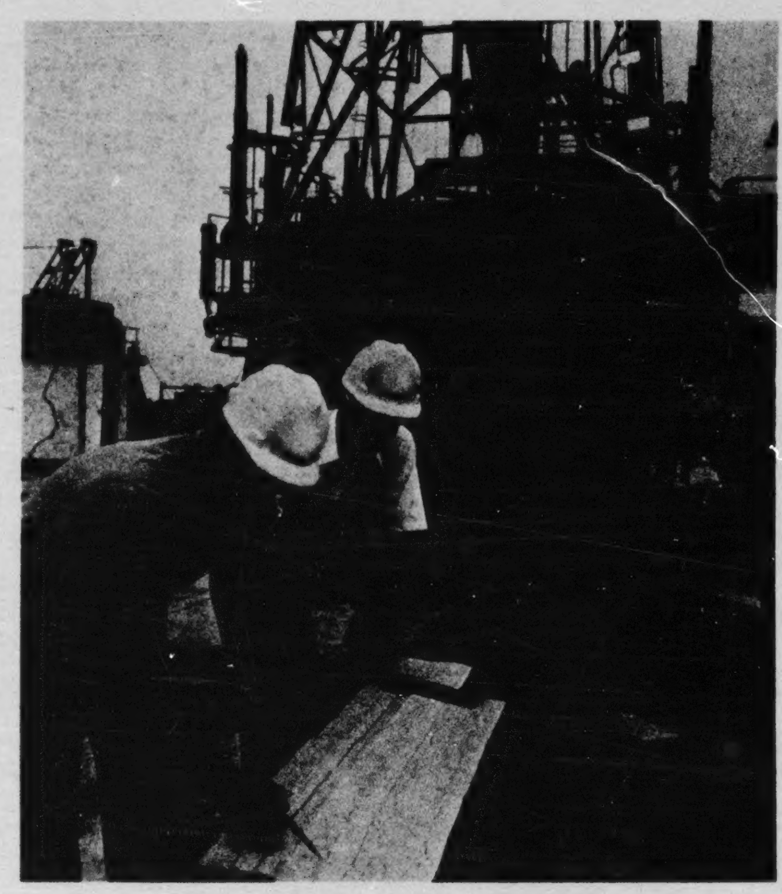
Students planning careers in exploration geology should like the outdoors, and must have physical stamina.

Geologists usually begin their careers in field exploration or as research assistants in laboratories. With experience, they can be promoted to project leader, program manager, or other management and research positions.

Employment Outlook

Employment opportunities in geology are expected to be good for those with a bachelor's degree in geology or in a related science with courses in geology; they are expected to be very good for those with advanced degrees in geology or a related science. The employment of geologists is expected to grow faster than the average for all occupations through the mid-1980's, creating several hundred new openings each year. In addition, a thousand or so openings will be created each year by geologists who retire, die, or transfer to other occupations.

Consumer and industrial demand for petroleum and minerals will continue to rise and efforts to attain energy self-sufficiency will mean that increased supply will come from domestic rather than foreign sources. Geologists will be required to locate and recover new deposits to fill this increased demand. Additional geologists will be needed to discover new resources and their potential uses. For example, geologists will help determine the feasibility of using geothermal energy (steam from the earth's interior) to generate electricity. Geologists are



Geologists sometimes work in remote places such as this offshore oil rig.

needed to devise techniques for exploring deeper within the earth's crust and to develop more efficient methods of mining resources. They also are needed to develop adequate water supplies and waste disposal methods, and to do site evaluation for construction activities.

Demand for geologists in Federal agencies will continue to grow, particularly in the U.S. Geological Survey. Growth in college and university employment will be at a slower rate than in the past, however.

Earnings and Working Conditions

Geologists have relatively high salaries, with average earnings over twice those of nonsupervisory workers in private industry, except farming.

Starting salaries for new graduates in private industry averaged $10,500 a year in 1974 for those having a bachelor's degree, $12,200 for those having a master's degree, and $16,000 for those having a doctorate, according to the American Geological Institute.

In the Federal Government in late 1974, geologists having a bachelor's degree could begin at $8,500 or $10,520 a year, depending on their college records. Those having a master's degree could start at $10,520 or $12,841 a year; those having the Ph. D. degree at $15,481 or $18,463. In late 1974, the average salary for geologists employed in the Federal Government was almost $24,000 a year.

Conditions of work vary. Exploration geologists often work overseas. Geologists travel to remote sites by helicopter and jeep, and cover large areas by foot, often working in teams. Geologists in mining sometimes work underground. When not working outdoors, they are in comfortable, well-lighted, well-ventilated offices and laboratories.

Sources of Additional Information

General information on career opportunities, training, and earnings for geologists is available from:

American Geological Institute, 5205 Leesburg Pike, Falls Church, Va. 22041.

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

GEOPHYSICISTS

(D.O.T. 024.081)

Nature of the Work

Geophysicists study the composition and physical aspects of the earth and its electric, magnetic, and gravitational fields. Geophysicists use highly complex instruments such as the magnetometer which measures variations in the earth's magnetic field, and the gravimeter which measures minute variations in gravitational attraction. They often use satellites to conduct tests in outer space and computers to collect and analyze data.

Geophysicists usually specialize in 1 of 3 general phases of the science—solid earth, fluid earth, and upper atmosphere. Some may also study other planets.

Solid earth geophysicists search for oil and mineral deposits, map the earth's surface, and study earthquakes. *Exploration geophysicists* use seismic prospecting techniques to locate oil and mineral deposits. They send sound waves into the earth and record the echoes bouncing off the rock layers below to determine if conditions are favorable for the accumulation of oil.

Seismologists study the earth's interior and earth vibrations caused by earthquakes and manmade explosions. They explore for oil and minerals, study underground detection of nuclear explosions, and provide information for use in constructing bridges, dams, and buildings. For example, in constructing a dam, seismologists determine where bedrock (solid rock beneath the soil) is closest to the surface so the best dam site can be selected. They use explosives to create sound waves which reflect off bedrock; the time it takes for the shock wave to return to the surface indicates the depth of bedrock.

Geodesists study the size, shape, and gravitational field of the earth and other planets. Their principal task is mapping the earth's surface. With the aid of satellites, geodesists determine the positions, elevations, and distances between points on the earth, and measure the intensity and direction of gravitational attraction.

Hydrologists are concerned with the fluid earth. They may study the distribution, circulation, and physical properties of underground and surface waters, including glaciers, snow, and permafrost. They may also study rainfall and its rate of infiltration into soil. Some are concerned with water supplies, irrigation, flood control, and soil erosion. (See statement on Oceanographers, sometimes classified as geophysical scientists, elsewhere in this book.)

Geophysicists study the atmosphere, investigate the earth's magnetic and electric fields, and compare its outer atmosphere with those of other planets. *Geomagneticians* study the earth's magnetic field. *Paleomagneticians* learn about past magnetic fields from rocks or lava flows. *Planetologists* study the composition and atmosphere of the moon, planets, and other bodies in the solar system. They gather data from geophysical instruments placed on interplanetary space probes or from equipment used by astronauts during the Apollo missions. *Meteorologists* are sometimes classified as geophysical scientists. (See statement on Meteorologists elsewhere in this book.)

Geophysicist prepares a portable seismograph for field operation.

Places of Employment

About 8,200 people worked as geophysicists in 1974. Most work in private industry, chiefly for petroleum and natural gas companies. Others are in mining companies, exploration and consulting firms, and research institutes. A few are independent consultants and some do geophysical prospecting on a fee or contract basis.

Geophysicists are employed in many southwestern and western States, including those on the Gulf Coast, where large oil and natural gas fields are located. Some geophysicists are employed by American firms overseas for varying periods of time.

Almost 2,000 geophysicists, geodesists, and hydrologists worked for Federal Government agencies in 1974, mainly the U.S. Geological Survey; the National Oceanic and Atmospheric Administration (NOAA); the Army Map Service; and the Naval Oceanographic Office. Other geophysicists work for colleges and universities, State governments, and nonprofit research institutions.

Training, Other Qualifications, and Advancement

A bachelor's degree in geophysics or a geophysical specialty is sufficient for most beginning jobs in geophysics. A bachelor's degree in a related field of science or engineering also is adequate preparation, provided the person has courses in geophysics, physics, geology, mathematics, chemistry, and engineering.

Geophysicists doing research or supervising exploration activities should have graduate training in geophysics or a related science. Those planning to teach in colleges or do basic research should acquire a Ph. D. degree.

About 50 colleges and universities award the bachelor's degree in geophysics. Other programs offering training for beginning geophysicists include geophysical technology, geophysical engineer- , engineering geology, petroleum geology, and geodesy.

More than 60 universities grant the master's and Ph. D. degree in geophysics. Candidates with a bachelor's degree which includes courses in geology, mathematics, physics, engineering, or a combination of these subjects can be admitted.

Geophysicists generally work as part of a team. They should be persons with curious and analytical minds and be able to communicate effectively.

Most new geophysicists begin their careers doing field mapping or exploration. Some assist senior geophysicists in research laboratories. With experience, geophysicists can advance to such jobs as project leader or program manager, or other management and research jobs.

Employment Outlook

Employment opportunities are expected to be excellent for graduates with a degree in geophysics, as well as for those with a degree in a related field and courses in this specialty. Combined openings, from both occupational growth and replacement needs, are not expected to be numerous in any one year. Nevertheless, new entrants to the field will fall short of requirements if present trends in the number obtaining suitable degrees continue.

Employment of geophysicists is expected to grow faster than the average for all occupations through the mid-1980's. Petroleum and mining companies will need geophysicists for exploration activities, expected to increase over the next decade. As the need for fuel and minerals grows, more geophysicists will be needed, using sophisticated electronic techniques, to find the less accessible fuel and mineral deposits.

In addition, geophysicists with advanced training will be needed to do research on radioactivity and cosmic and solar radiation and to investigate the use of geothermal power (steam from the earth's interior) as a source of energy to generate electricity.

Federal Government agencies are expected to hire more geophysicists for new or expanding programs. Jobs for geophysicists in the Federal Government are heavily dependent on funds for research and development in the earth sciences, which are expected to increase through the mid-1980's. The Government is expected to support energy research into both established and alternative sources. The Government also may fund research to locate more natural resources as well as to prevent environmental damage through better land use.

Earnings and Working Conditions

Geophysicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming.

Starting salaries in 1974 for geophysics graduates averaged $10,500 a year in private industry for those having a bachelor's degree, $12,200 for those having a master's degree and $16,000 for those having a doctorate, according to the American Geological Institute.

In the Federal Government in late 1974, geophysicists having a bachelor's degree could begin at $8,500 or $10,520 a year, depending on their college records. Geophysicists having a master's degree could start at $10,520 or $12,841 a year; those having a Ph. D. degree, at $15,481 or $18,463. In late 1974, the average salary for geophysicists employed by the Federal Government was almost $24,000 a year.

Many geophysicists work outdoors and must be willing to travel for extended periods of time. Some of them work at research stations in remote areas, or aboard ships and aircraft equipped with sophisticated geophysical equipment. When not in the field, geophysicists work in modern, well-equipped, well-lighted laboratories and offices.

Sources of Additional Information

General information on career opportunities, training, and earnings for geophysicists is available from:

American Geophysical Union, 1909 K St. NW., Washington, D.C. 20006

Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Okla. 74101

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St., NW., Washington, D.C. 20415.

METEOROLOGISTS

(D.O.T. 025.088)

Nature of the Work

Meteorology is the study of the atmosphere, which is the air that surrounds the earth. Meteorologists describe and try to understand the atmosphere's physical composition, motions, and processes, and determine the way these elements affect the rest of our physical environment. This knowledge is applied in understanding and forecasting the weather and climate to help solve many practical problems in agriculture, transportation, communications, health, and national defense.

Meteorologists who specialize in forecasting the weather, known professionally as *synoptic meteorologists*, are the largest group of specialists. They study current weather information, such as air pressure, temperature, humidity, and wind velocity, in order to make short- and long-range predictions. Their data come from weather satellites and observers in many parts of the world. Although some forecasters still prepare and analyze weather maps, most data now are plotted and analyzed by computers.

Meteorology however, involves many activities other than weather forecasting. Some meteorologists are engaged in basic and applied research. For example, *physical meteorologists* study the chemical and electrical properties of the atmosphere. They do research on the effect of the atmosphere on transmission of light, sound, and radio waves, as well as study factors affecting formation of clouds, rain, snow, and other weather phenomena. Other meteorologists, known as *climatologists*, study climatic trends and analyze past records on wind, rainfall, sunshine, and temperature to determine the general pattern of weather that makes up an area's climate. These studies are useful in planning heating and cooling systems, designing buildings, and aiding in effective land utilization.

Other meteorologists apply their knowledge in the study of the relationship between weather and specific human activities, biological processes, and agricultural and industrial operations. For example, they may make weather forecasts for individual companies, or may work on problems such as smoke control and air pollution abatement.

About one-third of all civilian meteorologists work primarily in weather forecasting, and another one-third work in research and development. Almost one-fifth of all civilian meteorologists are in administrative or management positions.

Some meteorologists teach or do research—frequently combining both activities—in colleges and universities. In colleges without separate departments of meteorology, they may teach geography, mathematics, physics, chemistry, or geology, as well as meteorology.

Places of Employment

About 5,600 persons—10 percent of them women—worked as meteorologists in 1974. In addition to these civilian meteorologists, about 2,000 officers and 7,000 enlisted members of the Armed Forces did forecasting and other meteorological work.

The largest employer of civilians was the National Oceanic and Atmospheric Administration (NOAA), where over 1,800 meteorologists worked at stations in all parts of the United States and in a small number of foreign areas. The Department of Defense employed over 200 civilian meteorologists.

Almost 2,000 meteorologists worked for private industry. Commercial airlines employed several hundred to forecast weather along flight routes and to brief pilots on atmospheric conditions. Others worked for private weather consulting firms, for companies that design and manufacture meteorological instruments, and for firms in aerospace, insurance, engineering, utilities, radio and television, and other industries.

Colleges and universities employed over 1,100 meteorologists in research and teaching. A few worked for State and local governments and for nonprofit organizations.

Although meteorologists work in all parts of the country, nearly one-fifth live in just two States—California and Maryland. Almost one-tenth of all meteorologists work in the Washington, D.C. area.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in meteorology is the usual minimum requirement for beginning jobs in weather forecasting. However, a bachelor's degree in a related science or engineering, along with some courses in meteorology, is acceptable for some jobs. For example, the Federal Government's minimum requirement for beginning jobs is a bachelor's degree with at least 20 semester hours of study in meteorology and additional training in physics and mathematics, including calculus. However, an advanced degree is increasingly necessary for advancement.

For research and college teaching and for many top-level positions in other meteorological activities, an advanced degree is essential, preferably in meteorology. However, people with graduate degrees in other sciences also may qualify if they have advanced courses in meteorology, physics, mathematics, and chemistry.

In 1974, 44 colleges and universities offered a bachelor's degree in meteorology; 59 schools offered advanced degrees in atmospheric science. Many other institutions offered some courses in meteorology.

The Armed Services give and support meteorological training, both undergraduate education for enlisted personnel and advanced study for officers.

NOAA has a program under which some of its meteorologists may attend college for advanced or specialized training. College students can obtain summer jobs with this agency or enroll in its cooperative education program in which they work at NOAA part of the year and attend school part of the year. In addition to helping students finance their education, this program gives them valuable experience for finding a job when they graduate.

Meteorologists in the Federal

Government usually start in 2-year training positions at weather stations. They observe weather conditions, receive training in forecasting, and release weather information to the public, agriculture, industry, airlines, and other users. They may advance to assistant forecaster and forecaster.

Airline meteorologists have somewhat limited opportunities for advancement. However, after considerable work experience, they may advance to flight dispatcher or to various supervisory or administrative jobs. A few very well qualified meteorologists with a background in science, engineering, and business administration may establish their own weather consulting services.

Employment Outlook

Job opportunities for meteorologists should be favorable through the mid-1980's. Although the number of openings created by growth in the occupation and replacement needs is not expected to be large in any one year, the number of persons obtaining degrees in meteorology also is small. If trends in the number of degrees granted continue, entrants to the field will about equal requirements.

Employment in the field, as a whole, is expected to increase about as fast as the average for all occupations. Employment of meteorologists in industry and in weather consulting firms is expected to grow as private industry realizes the importance of meteorology to understanding and preventing air pollution. Many companies are also recognizing the value of having their own weather forecasting and meteorological services which can be tailored to fit their needs. There also should be some openings in radio and television as stations increasingly rely on their own meteorologists to prepare and deliver their weather reports. State and local government employment of meteorologists should also grow, and colleges and universities will offer some job opportunities, especially for those with advanced degrees. The employment of civilian meteorologists by the Federal Government is not expected to grow significantly, although there will be openings created by replacement needs.

Earnings and Working Conditions

Meteorologists have relatively high earnings; their salaries are about twice the average for nonsupervisory workers in private industry, except farming.

In early 1974, meteorologists in the Federal Government with a bachelor's degree and no experience received starting salaries of $8,500 or $10,520 a year, depending on their college grades. Those with a master's degree could start at $10,520 or $12,841, and those with the Ph. D. degree at $15,481 or $18,463.

Airline meteorologists had average starting salaries of about $14,400 a year in 1974, and experienced airline meteorologists could receive up to $21,600 a year.

Jobs in weather stations, which are operated around the clock 7 days a week, often involve nightwork and rotating shifts. Most stations are at airports or in or near cities; some are in isolated and remote areas. Meteorologists in smaller weather stations generally work alone; in larger ones, they work as part of a team.

Sources of Additional Information

General information on career opportunities and schools offering education in meteorology is available from:

American Meteorological Society, 45 Beacon St., Boston, Mass. 02108.

American Geophysical Union, 1909 K St. NW., Washington, D.C. 20006.

For facts about job opportunities with the NOAA National Weather Service and its student cooperative education program, contact:

Personnel Division AD 41, National Oceanic and Atmospheric Administration, 6010 Executive Blvd., Rockville, Md. 20852.

Details about Air Force meteorological training programs are available from any Air Force recruiting office or from:

Air Weather Service, Information Office, Scott Air Force Base, Ill. 62225.

OCEANOGRAPHERS

(D.O.T. 024.081 and 041.081)

Nature of the Work

Oceans cover more than two-thirds of the earth's surface and provide people with valuable foods, fossil fuels, and minerals. They also influence the weather, serve as a "highway" for transportation, and offer many kinds of recreation. Oceanographers use the principles and techniques of natural science, mathematics, and engineering to study oceans—their movements, physical properties, and plant and animal life. Their research not only extends basic scientific knowledge, but also helps develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving national defense.

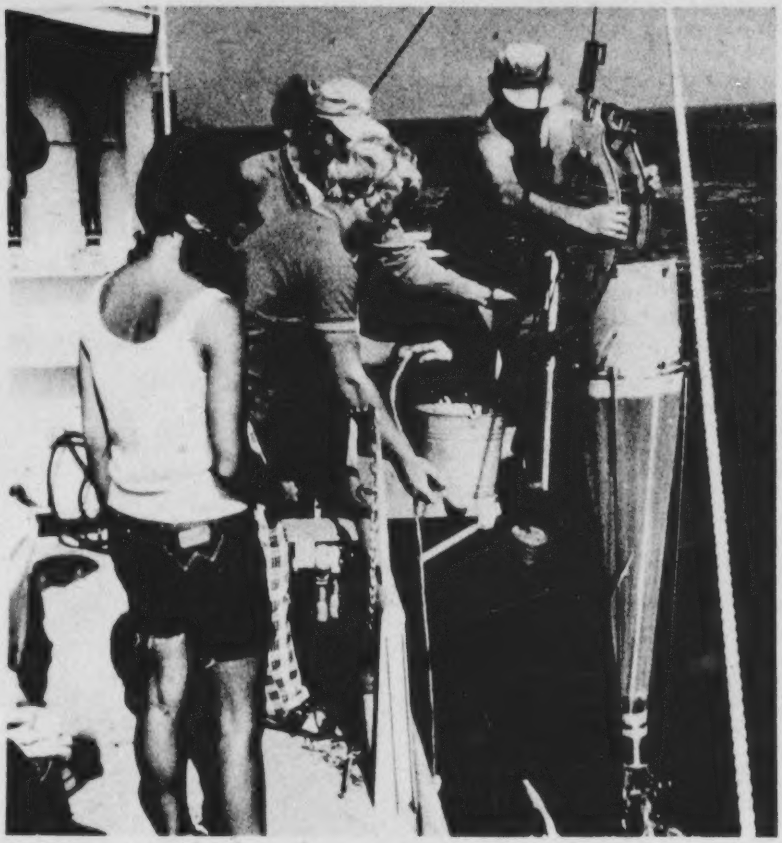
Some oceanographers make tests and observations and conduct experiments from ships or stationary platforms in the sea. They may study and collect data on ocean tides, currents, and other phenomena. Some study undersea mountain ranges and valleys, oceanic interaction with the atmosphere, and layers of sediment on and beneath the ocean floor.

Oceanographers also work in laboratories on land where, for example, they measure, dissect, and photograph fish. They also study exotic sea specimens and plankton (floating microscopic plants and animals). Much of their work entails identifying, cataloging, and analyzing different kinds of sea life and minerals. At other laboratories, oceanographers plot maps or use computers to test theories about the ocean. For example, they may study and test the theory of continental drift, which states that the continents were once joined together, have drifted apart, and continue to drift apart causing the sea floor to spread. To present the results of their studies, oceanographers prepare charts, tabulations, and reports, and write papers for scientific journals.

Oceanographers explore and study the ocean with aircraft, surface ships, and various types of underwater craft. They use specialized instruments to measure and record the findings of their explorations and studies. Special cameras equipped with strong lights are used to photograph marine life and the ocean floor. Sounding devices are used to measure, map, and locate ocean materials.

Most oceanographers specialize in one branch of the science. *Biological oceanographers* (marine biologists) study plant and animal life in the ocean. They search for ways to extract drugs from marine plants or animals, investigate life processes of marine animals, and determine the effects of radioactivity and pollution on marine life. *Physical oceanographers* (physicists and geophysicists) study the physical properties of the ocean. Their research on the relationships between the sea and the atmosphere may lead to more accurate prediction of the weather. *Geological oceanographers* (marine geologists) study the ocean's mountain ranges, rocks, and sediments. Locating regions where minerals, oil, and gas might be found under the ocean floor is an application of their work. *Chemical oceanographers* investigate the chemical composition of ocean water and sediments as well as chemical reactions in the sea. *Oceanographic engineers* and *electronic specialists* design and build instruments for oceanographic research and operations. They also lay cables and supervise underwater construction.

Most oceanographers work in States that border on the ocean, although there are some oceanographers employed in almost every State. Four out of ten oceanographers work in just three States—California, Maryland, and Virginia.



Oceanographers collect samples of sea life.

Places of Employment

About 2,500 persons—about 5 percent of them women—worked as oceanographers in 1974. About one-half worked in colleges and universities, and more than one-fourth for the Federal Government. Federal agencies employing substantial numbers of oceanographers include the Navy and the National Oceanic and Atmospheric Administration (NOAA). Some oceanographers work in private industry; a few work for fishery laboratories of State and local governments.

Training, Other Qualifications, and Advancement

The minimum requirement for beginning professional jobs in oceanography is a bachelor's degree with a major in oceanography, biology, earth or physical sciences, mathematics, or engineering. Professional jobs in research, teaching, and high-level positions in most other types of work require graduate training in oceanography or a basic science.

Only 35 colleges and universities offered undergraduate degrees in oceanography or marine sciences in 1974. However, since oceanography is an interdisciplinary science, undergraduate training in a basic science and a strong interest in oceanography may be adequate preparation for some beginning jobs and would be a good background for graduate training in oceanography.

Important college courses for graduate study in oceanography include mathematics, physics, chemistry, geophysics, geology, meteorology, and biology. In general, students should specialize in the particular science that is closest to their area of oceanographic interest. For example, students interested in chemical oceanography could obtain a degree in chemistry.

In 1974, about 65 colleges offered advanced degrees in oceanography and marine sciences. In graduate schools, students take advanced courses in oceanography and in a basic science.

Graduate students usually work part of the time aboard ship, where they do oceanographic research and become familiar with the sea and with techniques used to obtain oceanographic information. Universities having oceanographic research facilities along our coasts offer summer courses for both graduates and undergraduate students, which are especially beneficial for students from inland universities. Oceanographers should have the curiosity needed to do new research and the patience to collect data and conduct experiments.

Beginning oceanographers with the bachelor's degree usually start as research or laboratory assistants, or in jobs involving routine data collection, computation, or analysis. Most beginning oceanographers receive on-the-job training. The extent of the training varies with the background and needs of the individual.

Experienced oceanographers often direct surveys and research programs or advance to administrative or supervisory jobs in research laboratories.

Employment Outlook

Persons seeking jobs in oceanography may face competition through the mid-1980's. Those with a Ph. D. degree should have more favorable employment opportunities than others, while those with less education may find opportunities limited to routine analytical work as research assistants or technicians.

Employment of oceanographers is expected to grow about as fast as the average for all occupations. This growth will result from increased awareness of the need for ocean research for understanding and controlling pollution, for recovering natural resources, and for national defense. However, growth in employment may not be rapid enough to create enough openings for all those expected to seek entry into this relatively small field. Since the Federal Government finances most oceanographic research, a large increase in Federal spending in oceanography could improve employment prospects.

Earnings and Working Conditions

Oceanographers have relatively high earnings. Their average salaries were more than twice the average received by nonsupervisory workers in private industry, except farming.

In late 1974, oceanographers in the Federal Government with the bachelor's degree received starting salaries of $8,500 or $10,520 a year, depending on their college grades. Those with the master's degree could start at $10,520 or $12,841; and those with the Ph. D. degree at $15,481 or $18,463. The average salary for experienced oceanographers in the Federal Government in late 1974 was about $21,800 a year.

Beginning oceanographers in educational institutions generally receive the same salaries as other faculty members. (See statement on College and University Teachers elsewhere in this book.) In addition to regular salaries, many experienced oceanographers earn extra income from consulting, lecturing, and writing.

Oceanographers engaged in research that requires sea voyages are frequently away from home for weeks or months at a time. Sometimes they live and work in cramped quarters. People who like the sea and oceanographic research often find these voyages satisfying and do not consider the time spent at sea a disadvantage of their work.

Sources of Additional Information

For information about careers in oceanography, contact:

Office of Sea Grant, National Oceanic and Atmospheric Administration, Rockville, Md. 20852.

Dr. George W. Saunders, Secretary, American Society of Limnology and Oceanography, P.O. Box 853, Gaithersburg, Md. 20760.

Federal Government career information is available from any regional office of the U.S. Civil Service Commission or from:

U.S. Civil Service Commission, Washington Area Office, 1900 E St. NW., Washington, D.C. 20415.

The booklet, *Training and Careers in Marine Science*, is available for a small charge from:

International Oceanographic Foundation, 10 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33149.

Some information on oceanographic specialties is available from professional societies listed elsewhere in this book. (See statements on Geologists, Geophysicists, Life Scientists, Meteorologists, and Chemists.)

LIFE SCIENCE OCCUPATIONS

Life scientists study living organisms and their life processes. They are concerned with the origin and preservation of life, from the largest animal to the smallest living cell. The number and variety of plants and animals is so large, and their processes so varied and complex, that life scientists usually work in one of the three broad areas—agriculture, biology, or medicine.

Life scientists teach, perform basic research to expand knowledge of living things, and apply knowledge gained from research to the solution of practical problems. New drugs, special varieties of plants, and a cleaner environment result from the work of life scientists.

This section discusses life scientists as a group. It also contains separate statements on biochemists and soil scientists.

BIOCHEMISTS

(D.O.T. 041.081)

Nature of the Work

Biochemists study the chemical behavior and chemical nature of living things. Since life is based on complex chemical combinations and reactions, the work of biochemists is vital for an understanding of the basic functions of living things such as reproduction and growth. As part of their study of the chemistry of living things, biochemists may also investigate the effects of substances such as food, hormones, or drugs on various organisms.

The methods and techniques of biochemistry are applied in areas such as medicine and agriculture. For instance, biochemists develop diagnostic procedures or find cures for diseases or identify the nutrients necessary to maintain good health.

More than 3 out of 4 biochemists work in basic and applied research activities. The distinction between basic and applied research is often one of degree and biochemists may do both types. Most, however, are in basic research. The few doing strictly applied research use the results of basic research for practical uses. For example, the knowledge of how an organism forms a hormone is used to develop a process for synthesizing the hormone and producing it on a mass scale.

Laboratory research involves weighing, filtering, distilling, drying, and culturing (growing microorganisms). Some experiments also require sophisticated tasks such as designing and constructing laboratory apparatus or performing tests using radioactive tracers. Biochemists use a variety of instruments, including electron microscopes, and may devise new instruments and techniques as needed. They usually report the results of their research in scientific journals or before scientific groups.

Some biochemists combine research with teaching in colleges and universities. A few work in industrial production and testing activities.

Places of Employment

About 12,400 biochemists were employed in the United States in 1974. Although the exact number of women working in the profession is not known, nearly one-fourth of those receiving advanced degrees in biochemistry in recent years have been women.

More than half of all biochemists are employed in colleges and universities, and most of these do basic and applied research and development in university-operated laboratories and hospitals. Almost one-quarter of all biochemists work in private industry, primarily in companies manufacturing drugs, insecticides, and cosmetics. Nonprofit research institutes and foundations employ some biochemists and some also work for Federal, State, and local government agencies. Most government biochemists do research for Federal agencies concerned with health and agricultural problems. There are a few self-employed biochemists who are consultants to industry and government.

Training, Other Qualifications, and Advancement

The minimum educational requirement for many beginning jobs as a professional biochemist, especially in research or teaching, is an advanced degree. A Ph. D. degree is a virtual necessity for persons who hope to make significant contributions to biochemical research and for advancement to many management and administrative jobs. A bachelor's degree with a major in biochemistry or chemistry, or with a major in biology and a minor in chemistry, may qualify some persons for entry jobs as research assistants or technicians.

More than 50 schools award the bachelor's degree in biochemistry, and nearly all colleges and universities offer a major in biology or chemistry. Regardless of their college major, future biochemists should take undergraduate courses in chemistry, biology, biochemistry, mathematics, and physics.

About 200 colleges and universities offer graduate degrees in biochemistry. Graduate students generally are required to have a bachelor's degree in biochemistry, biology, or chemistry. Many graduate schools offer programs that emphasize some fields or specialties of biochemistry over others because of the influence of the type of research being done at the school. Therefore, students wishing to specialize should select their schools carefully. Graduate training requires actual research in addition to advanced science courses. For the doctoral degree, the student specializes in one field of biochemistry by doing intensive research and writing a thesis.

Young people planning careers as biochemists should be able to work independently or as part of a team. Precision, keen powers of observation, and mechanical aptitude also are important. Biochemists should have analytical abilities and curious minds, as well as the patience and perseverance needed to complete the hundreds of experiments that may be necessary to solve one problem.

Graduates with advanced degrees may begin their careers as teachers or researchers in colleges or universities. In private industry, most begin in research jobs and with experience may advance to positions in which they plan and supervise research.

New graduates with a bachelor's degree usually start work as research assistants or technicians. These jobs in private industry often involve testing and analysis. In the drug industry, for example, research assistants analyze the ingredients of a product to verify and maintain its purity or quality.

Biochemist builds a model of a complex molecule.

Employment Outlook

Job opportunities for biochemists with advanced degrees should be favorable through the mid-1980's. The employment of biochemists is expected to grow faster than the average for all occupations during this period, creating hundreds of job openings each year. There also will be many openings each year resulting from biochemists who retire, die, or transfer to other occupations. The outlook for biochemists is based on the assumption that research and development expenditures in biochemistry and related sciences, primarily by the Federal Government, will increase through the mid-1980's, although at a slower rate than during the 1960's. If actual research and development expenditures differ significantly from those assumed, the outlook for biochemists would be altered.

The anticipated growth in this field should result from the effort to find cures for cancer, heart disease, and other diseases, and from public concern with environmental protection. Biochemists will also be needed in the drug and other industries and in hospitals and health centers. There will also be some teaching opportunities in colleges and universities, but the recent slowdown in the growth in college enrollments may mean fewer teaching opportunities than in the past.

Earnings and Working Conditions

Biochemists have relatively high salaries; average earnings were about twice the average for all nonsupervisory workers in private industry, except farming. According to a 1974 survey by the American Chemical Society, salaries for experienced biochemists averaged $15,000 for those with a bachelor's degree; $15,100 for those with a master's degree; and $21,500 for those with a Ph. D.

Starting salaries paid to biochemists employed by colleges and universities are comparable to those for other faculty members. Biochemists in educational institutions often supplement their incomes by engaging in outside research or consulting work.

Sources of Additional Information

For general information on careers in biochemistry, contact:

American Society of Biological Chemists, 9650 Rockville Pike, Bethesda, Md. 20014.

LIFE SCIENTISTS

(D.O.T. 040.081, 041.081, 041.168, 041.181, 041.281)

Nature of the Work

Life scientists study all aspects of living organisms, emphasizing the relationship of animals and plants to their environments.

Almost one-half of all life scientists are in research and development. Many work in laboratories conducting basic research aimed at adding to our knowledge of living organisms. Knowledge gained from this research is applied in medicine, in improvement of crop yields, and to the betterment of the natural environment. When working in laboratories, life scientists must be familiar with research techniques and complex laboratory equipment such as electron microscopes. Knowledge of computers also is useful in conducting some experiments. Not all research, however, is performed in laboratories. For example, a botanist who explores the volcanic Alaskan valleys to see what plants grow there also is doing research.

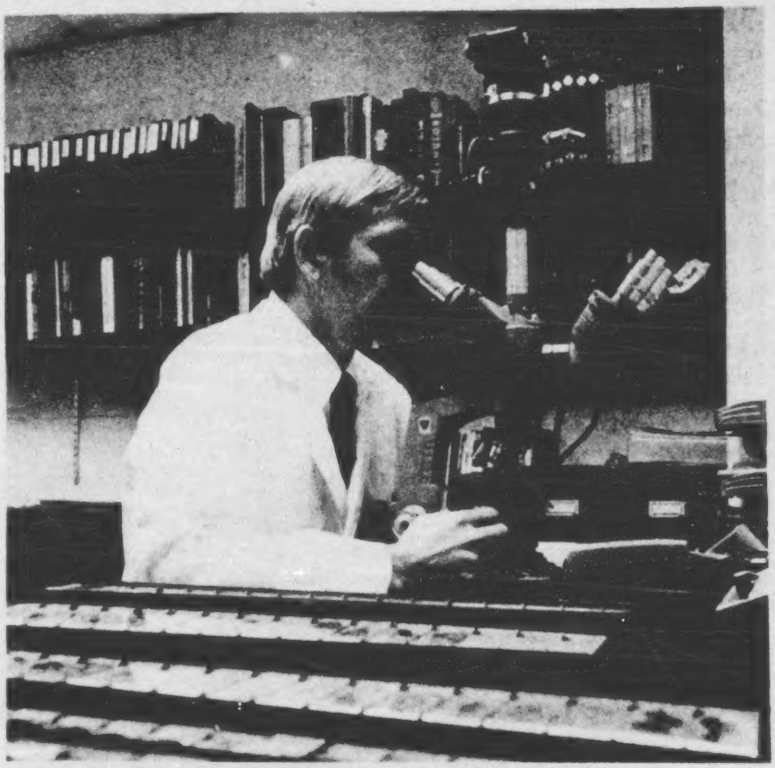
Teaching in a college or university is the major area of work for more than one-fourth of all life scientists, many of whom also do independent research. Almost one-fifth are in some type of management and administrative work that ranges from planning and administering programs for testing foods and drugs to directing activities at zoos or botanical gardens. Some life scientists work as consultants to business firms or to government in their areas of specialization. Others write for technical publications or test and inspect foods, drugs, and other products. Some work in technical sales and services jobs for industrial companies where, for example, they demonstrate the proper use of new chemicals or technical products.

Scientists working in many areas of the life sciences often call themselves *biologists*. However, the majority are classified by the type of organism they study or by the specific activity performed.

Life scientists dealing primarily with plants are *botanists*. Some study all aspects of plant life, while others work in specific areas such as identifying and classifying plants or studying the structure of plants and plant cells. Some botanists concentrate on the cause and cure of plant diseases.

Some life scientists are concerned with the mass development of plants. *Agronomists* improve the quality and yield of crops by developing new growth methods or by controlling disease, pests, and weeds. They also analyze soils to determine ways of increasing acreage yields and decreasing soil erosion. *Horticulturists* work with orchard and garden plants such as fruit and nut trees, vegetables, and flowers. They seek to improve plant culture methods for the purposes of beautification of communities, homes, parks, and other areas as well as for increasing crop quality and yields.

Zoologists concentrate on animal life—its origin, behavior, and life processes. Some conduct experimental studies with live animals and others examine dissected animals in



Life scientist examines animal tissue.

laboratories. Zoologists are usually identified by the animal group studied—ornithologists (birds), entomologists (insects), and mammalogists (mammals).

Animal husbandry specialists do research on the breeding, feeding, and diseases of domestic farm animals. *Veterinarians* study diseases and abnormal functioning in animals. (See statement on Veterinarians elsewhere in this book.)

Life scientists who investigate the growth and characteristics of microscopic organisms such as bacteria, viruses, and molds are called *microbiologists*. They isolate organisms and grow them for close examination under a microscope. *Medical microbiologists* are concerned with problems such as the relationship between bacteria and disease or the effect of antibiotics on bacteria. Other microbiologists may specialize in soil bacteriology (effect of micro-organisms on soil fertility), virology (viruses), or immunology (mechanisms that fight infections).

Anatomists study the structure of organisms, from cell structure to the formation of tissues and organs. Many specialize in human anatomy. Research methods may entail dissections or the use of electron microscopes.

Some life scientists apply their specialized knowledge across a number of areas, and may be classified by the functions performed. *Ecologists*, for example, study the mutual relationship among organisms and their environments. They are interested in the effects of environmental influences such as rainfall, temperature, and altitude on organisms. For example, ecologists extract samples of plankton (microscopic plants and animals) from bodies of water to determine the effects of pollution, and measure the radioactive content of fish.

Embryologists study the development of an organism from a fertilized egg through the hatching process or gestation period. They investigate the causes of healthy and abnormal development in organisms.

Nutritionists examine the bodily processes through which food is utilized and transformed into energy. They learn how vitamins, minerals, proteins, and other nutrients build and repair tissues.

Pharmacologists conduct tests on animals such as rats, guinea pigs, and monkeys to determine the effects of drugs, gases, poisons, dusts, and other substances on the functioning of tissues and organs. They may develop new or improved drugs and medicines.

Pathologists specialize in the effects of diseases, parasites, and insects on human cells, tissues, and organs. Others may investigate genetic variations caused by drugs.

Biochemists and biological oceanographers, who are also life scientists, are included in separate statements elsewhere in this book.

Places of Employment

An estimated 190,000 persons worked as life scientists in 1974. Almost 50,000 were agricultural scientists, about 75,000 were biological scientists, and almost 65,000 were medical scientists. About one-fifth of all biological and agricultural scientists were women.

Colleges and universities employ nearly three-fifths of all life scientists, in both teaching and research jobs. Medical schools and hospitals also employ large numbers of medical investigators. Sizable numbers of agronomists, horticulturists, animal husbandry specialists, entomologists, and other agriculture-related specialists work for State agricultural colleges and agricultural experiment stations.

About 25,000 life scientists worked for the Federal Government in 1974. Of these, almost half worked for the Department of Agriculture, with large numbers also in the Department of the Interior, and in the National Institutes of Health. State and local governments combined employed 21,000 life scientists.

Approximately 25,000 life scientists work in private industry, mostly in the pharmaceutical, industrial chemical, and food processing industries. More than 4,000 work for nonprofit research organizations and foundations and a few are self-employed.

Life scientists are fairly evenly distributed across the United States, but there are employment concentrations in some metropolitan areas—for example, nearly 6 percent of all agricultural and biological scientists work in the Washington, D.C. metropolitan area. Life science teachers are concentrated in communities with large universities.

Training, Other Qualifications, and Advancement

Young people seeking a career in the life sciences should plan to obtain an advanced degree. The Ph. D. degree generally is required for college teaching and for independent research. It is also necessary for many jobs administering research programs. A master's degree is sufficient for some jobs in applied research and college teaching. A professional health degree is necessary for some jobs in medical research (See section on Health Occupations elsewhere in this book.)

The bachelor's degree is adequate preparation for some beginning jobs, but promotions often are limited for those who hold no higher degree. New graduates with a bachelor's degree can start their careers in testing and inspecting jobs, or become technical sales and service representatives. They also may become advanced technicians, particularly in medical research or, with courses in education, a high school biology teacher. (See statement on Secondary

School Teachers elsewhere in this book.)

Most colleges and universities offer life science curriculums. However, courses differ from one college to another. For example, liberal arts colleges may emphasize the biological sciences, while many State universities and land grant colleges offer good programs in agricultural science.

Young people seeking careers in the life sciences should obtain the broadest possible undergraduate background in biology and other sciences. Courses taken should include biology, chemistry, physics, and mathematics.

Many colleges and universities confer advanced degrees in the life sciences. Requirements for advanced degrees usually include field work and laboratory research as well as classroom studies and preparation of a thesis.

Young people planning careers as life scientists should be able to work independently or as part of a team and must be able to communicate well. Physical stamina is necessary for those interested in research in remote places.

Life scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervisors of research programs.

Employment Outlook

Employment opportunities for life scientists are expected to be good for those with advanced degrees through the mid-1980's, but those with lesser degrees may experience competition for available jobs. However, a degree in life science is also useful for entry to occupations related to life science such as research assistant, laboratory technologist, and the health care occupations. Employment in the life sciences is expected to increase faster than the average for all occupations over this period, creating many new jobs. In addition, some openings will occur as life scientists retire, die, or transfer to other occupations.

The growth in employment in the life sciences will be influenced by the increased interest in preserving the natural environment and by a continuing interest in medical research. Employment opportunities in industry and government should increase because of a need for research and development in environmentally related areas and to administer new laws and standards for environmental protection. Greater interest in the environment on the part of college, junior college, and high school students could result in some increased opportunities for life science teachers in these schools. While employment in colleges and universities is expected to increase, it will grow at a slower rate than in the past, primarily because of the anticipated slower overall rate of growth in college and university enrollments.

Life scientist measures the sensitivity of an instrument designed to detect the presence of life in the upper atmosphere.

Earnings and Working Conditions

Life scientists receive relatively high salaries; their average earnings are more than twice those of nonsupervisory workers in private industry, except farming.

Beginning salary offers in private industry in 1974 averaged $9,420 a year for bachelor's degree recipients in agricultural science and $8,640 a year for bachelor's degree recipients in biological science.

In the Federal Government in late 1974, life scientists having a bachelor's degree could begin at $8,500 or $10,520 a year, depending on their college records. Life scientists having the master's degree could start at $10,520 or $12,841, depending on their academic records or previous work experience. Those having the Ph. D. degree could begin at $15,481 or $18,463. Agricultural and biological scientists in the Federal Government averaged $20,300 a year.

Earnings of all biological scientists averaged about $18,500 a year in 1974. Life scientists who have the M.D. degree generally earn more than other life scientists but less than physicians in private practice.

Most life scientists work in well-lighted, well-ventilated, and clean laboratories. Some jobs, however, require working outdoors under extreme weather conditions, doing strenuous physical work.

Sources of Additional Information

General information on careers in the life sciences is available from:

American Institute of Biological Sciences, 1401 Wilson Boulevard, Arlington, Va. 22209.

American Society for Horticultural Science, National Center for American Horticulture, Mt. Vernon, Va. 22121.

American Physiological Society, Education Office, 9650 Rockville Pike, Bethesda, Md. 20014.

Dr. J. Frank McCormick, Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tenn. 37916.

Special information on Federal Government careers is available from:

U.S. Civil Service Commission, Washington Area Office, 1900 E St. NW., Washington, D.C. 20415.

SOIL SCIENTISTS

(D.O.T. 040.081)

Nature of the Work

Soil scientists study the physical, chemical, and biological characteristics and behavior of soils. They investigate soils both in the field and in the laboratory and classify them according to a national system of soil classification. From their research, scientists can classify soil to respond to management questions concerning its capability to produce crops, grasses, and trees, and its suitability for the erection of foundations for buildings and other structures. Soil scientists prepare maps, usually based on aerial photographs, on which they plot the individual kinds of soil and other landscape features significant to soil type and management in relation to land ownership lines, field boundaries, roads, and other conspicuous features.

Soil scientists also conduct research to determine the physical and chemical properties of soils to understand their behavior and origin. They predict the yields of cultivated crops, grasses, and trees, under alternative combinations of management practices.

Soil science offers opportunities for those who wish to specialize in soil classification and mapping, soil geography, soil chemistry, soil physics, soil microbiology, and soil management. Training and experience in soil science also will prepare persons for positions as farm managers, land appraisers, and many other professional positions.

Places of Employment

An estimated 3,500 soil scientists were employed in 1974. Most soil scientists are employed by agencies of the Federal Government, State experiment stations, and colleges of agriculture. However, many are employed in a wide range of other public and private institutions, including fertilizer companies, private research laboratories, insurance companies, banks and other lending agencies, real estate firms, land appraisal boards, State conservation departments, and farm management agencies. A few are independent consultants, and others work for consulting firms. An increasing number are employed in foreign countries as research leaders, consultants, and agricultural managers.

Training and Advancement

Training in a college or university of recognized standing is important in obtaining employment as a soil scientist. For Federal employment, the minimum qualification for entrance is a bachelor's degree with a major in soil science or in a closely related field of study, and with 30-semester hours of course work in the biological, physical, and earth sciences, including a minimum of 15 semester hours in soils. In the case of soils research, those having graduate training—especially those with the doctorate—can be expected to advance into a responsible and high paying position. Soil scientists who are qualified for work with both field and laboratory data have a special advantage.

Many colleges and universities offer fellowships and assistantships for graduate training, or employ graduate students for part-time teaching or research.

Employment Outlook

The demand is increasing for soil scientists to help complete the scientific classification and evaluation of the soil resources in the United States. One of the major program objectives of the Soil Conservation Service of the U.S. Department of Agriculture is to complete the soil survey of all rural lands in the United States. This program includes soil classification and soil interpretation for use by agriculturists, engineers, and land-use planners.

Also, demand is increasing for both basic and applied research to increase the efficiency of soil use.

Earnings

The incomes of soil scientists depend upon their education, professional experience, and individual abilities. The entrance salary in the Federal service for graduates having a B.S. degree was $8,500 in late 1974. They may expect advancement to $10,520 after 1 year of satisfactory performance. Further promotion depends upon the individual's ability to do high quality work and to accept responsibility. Earnings of well-qualified Federal soil scientists with several years of experience range from $15,481 to $25,581 a year.

Sources of Additional Information

Additional information may be obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; any office of the Department's Soil Conservation Service; any college of agriculture; or the American Society of Agronomy, 677 S. Segoe Rd., Madison, Wis. 53711.

See also statements on Chemists and Life Scientists.

MATHEMATICS OCCUPATIONS

Mathematics is both a science and a tool essential for many kinds of work. As a tool, mathematics is necessary for understanding and expressing ideas in science, engineering, and, increasingly, in human affairs. The application of mathematical techniques in these fields has increased greatly because of the widespread use of computers, which enable mathematicians to do complex problems rapidly and efficiently. As a result, employment opportunities for persons trained in mathematics have expanded rapidly in recent years.

Young people considering careers in mathematics should be able to concentrate for long periods of time. They should enjoy working independently with ideas and solving problems, and must be able to present their findings in written reports.

This section describes two occupations—mathematician and statistician. A statement on actuaries, a closely related mathematics occupation, is discussed in the section on Insurance Occupations. Entrance into any of these fields requires college training in mathematics. For many types of work, graduate education is necessary.

Many other workers in the natural and social sciences and in data processing use mathematics extensively, although they are not primarily mathematicians. These occupations are discussed elsewhere in this book, as are jobs for high school mathematics teachers, covered in the statement on Secondary School Teachers.

MATHEMATICIANS

(D.O.T. 020.088)

Nature of the Work

Mathematicians today are engaged in a wide variety of activities, ranging from the creation of new theories to the translation of scientific and managerial problems into mathematical terms.

There are two broad classes of mathematical work: pure (theoretical) mathematics; and applied mathematics, which includes solving numerical problems. Theoretical mathematicians advance mathematical science by developing new principles and new relationships between existing principles of mathematics. They seek to increase basic knowledge without necessarily considering its practical use. Yet, this pure and abstract knowledge has been instrumental in producing many scientific and engineering achievements. For example, in 1854 Bernard Riemann invented a seemingly impractical non-Euclidian geometry that was to become part of the theory of relativity developed by Albert Einstein more than a half-century later.

Mathematicians in applied work use mathematics to develop theories, techniques, and approaches to solve problems in natural science, social science, management, and engineering. Their work ranges from analysis of the reliability of space vehicle systems to studies of the effects of new drugs on disease.

Much work in applied mathematics, however, is carried on by persons other than mathematicians. In fact, the number of workers who depend to a greater or lesser extent upon mathematical expertise is many times greater than the number actually designated as mathematicians.

Places of Employment

About 40,000 persons worked as mathematicians in 1974, about one-fifth of them women.

Roughly three-fourths of all mathematicians worked in colleges and universities. Most were teachers; some worked mainly in research and development with few or no teaching duties.

Mathematician considers technical problem as explained by engineer.

Most other mathematicians worked in private industry and government. In the private sector, major employers were the aerospace, communications, machinery, and electrical equipment industries. The Department of Defense employed most of the mathematicians working in the Federal Government.

Mathematicians work in all States, but are concentrated in those with large industrial areas and large college and university enrollments. Nearly half of the total are employed in seven States—California, New York, Massachusetts, Pennsylvania, Illinois, Maryland, and New Jersey. Of the total, one-fourth live in three metropolitan areas—New York City; Washington, D.C.; and Los Angeles-Long Beach, California.

Training, Other Qualifications, and Advancement

An advanced degree is the basic requirement for beginning teaching jobs, as well as for most research positions. In most colleges and universities, the Ph. D. degree is necessary for full faculty status.

Advanced degrees are also required for an increasing number of jobs in industry and government, in research, and in many areas of applied mathematics. However, the bachelor's degree is adequate preparation for many positions in private industry and the Federal Government.

Some new graduates having a bachelor's degree assist senior mathematicians by performing computations and solving less advanced problems in applied research. Others work as research or teaching assistants in colleges and universities while studying for an advanced degree.

The bachelor's degree in mathematics is offered by most colleges and universities. Mathematics courses usually required for a degree are analytical geometry, calculus, differential equations, probability and statistics, mathematical analysis, and modern algebra. A prospective college mathematics student should take as many mathematics courses as possible while still enrolled in high school.

More than 400 colleges and universities have programs leading to the master's degree in mathematics; about 150 also offer the Ph. D. In graduate school, students build upon the basic knowledge acquired in earlier studies. They usually concentrate on a specific field of mathematics, such as algebra, mathematical analysis, or statistics, by conducting research and taking advanced courses.

For work in applied mathematics, training in the field in which the mathematics will be used is very important. Fields in which applied mathematics is used extensively include physics, engineering, and operations research; of increasing importance are business and industrial management, economics, statistics, chemistry and life sciences, and the behavioral sciences. Training in numerical analysis and programming is especially desirable for mathematicians working with computers.

Mathematicians need good reasoning ability, persistence, and the ability to apply basic principles to new types of problems. They must be able to communicate well with others since they often must listen to a non-mathematician describe a problem in general terms, and check and recheck to make sure they understand the mathematical solution that is needed.

Employment Outlook

Although employment of mathematicians is expected to increase about as fast as the average for all occupations through the mid-1980's, this rate of growth is slower than occurred in the past. Even if the number of degrees granted in mathematics each year remains at its present level, the number of people seeking employment is expected to exceed job openings. As a result, persons seeking employment as mathematicians are expected to face keen competition throughout the period.

Theoretical mathematicians are expected to have the most difficulty in finding employment. They have traditionally worked in colleges and universities, where employment growth is now expected to be slowest.

Holders of advanced degrees in applied mathematics should have the least difficulty in finding satisfactory employment. Private industry and governmental agencies will need applied mathematicians for work in operations research, numerical analysis, computer systems programming, applied mathematical physics, market research and commercial surveys, and as consultants in industrial laboratories. Work in applied mathematics requires both a high degree of mathematical competence and a knowledge of the field of application.

College graduates with degrees in mathematics should be able to find jobs in other fields, because the education necessary for a degree in mathematics is also a good background for other jobs that rely heavily on the application of mathematical theories and methods. Mathematics majors are likely to find openings in statistics, actuarial work, computer programming, systems analysis, economics, engineering, and physical and life sciences. Employment opportunities in these fields will probably be best for those who combine a major in mathematics with a minor in one of these subjects.

New graduates will also find openings as high school mathematics teachers after completing professional education courses and other requirements for a State teaching certificate. (See section on Secondary School teachers elsewhere in this book.)

Earnings and Working Conditions

In 1974, mathematicians earned average salaries over twice as high as the average for nonsupervisory workers in private industry, except farming. Starting salaries for mathematicians with a bachelor's degree averaged about $10,300 a year. Those with a master's degree could start at about $12,500 annually. Salaries for new graduates having the Ph. D., most of whom had some experience, averaged over $16,000.

In the Federal Government in 1974, mathematicians having the bachelor's degree and no experience could start at either $8,500 or $10,520 a year, depending on their college records. Those with the master's degree could start at $12,841 or $15,481; and persons having the Ph. D. degree could begin at either $15,481 or $18,463. The average salary for all mathematicians in the Federal Government was about $21,500 in 1974.

Salaries paid to college and university teachers vary greatly depending both on the quality and location of the school and the ability and experience of the individual. According to the American Mathematical Society, college and university teachers generally earned from as low as $8,000 a year (instructors) to as high as $25,000 a year (professors)in 1974. Some were paid over $30,000 annually.

Mathematicians on college and university staffs often supplement their regular salaries with income from summer teaching, special research projects, consulting, and writing.

Sources of Additional Information

Several brochures are available that give facts about the field of mathematics, including career opportunities, professional training, and colleges and universities with degree programs.

Seeking Employment in the Mathematical Sciences is available for 25 cents from:

American Mathematical Society, P.O. Box 6248, Providence, R.I. 02940.

Professional Opportunities in Mathematics (50 cents) and *Guide Book to Departments in the Mathematical Sciences* (75 cents) are provided by:

Mathematical Association of America, 1225 Connecticut Ave. NW., Washington, D.C. 20036.

For specific information on careers in applied mathematics, contact:

Society for Industrial and Applied Mathematics, 33 S. 17th St., Philadelphia, Pa. 19103.

For Federal Government career information, contact any regional office of the U.S. Civil Service Commission or:

Interagency Board of U.S. Civil Service Examiners, 1900 E St. NW., Washington, D.C. 20415.

STATISTICIANS

(D.O.T. 020.188)

Nature of the Work

Statistics are numbers that help describe the characteristics of the world and its inhabitants. Statisticians devise, carry out and analyze surveys and experiments, and interpret their numerical results. In doing so, they apply their knowledge of statistical methods to a particular subject area, such as economics, human behavior, natural science, or engineering. They may use statistical techniques to predict population growth or economic conditions, develop quality control tests for manufactured products, or help business managers and government officials make decisions and evaluate the results of new programs.

Statistician assembles data for market research project.

Often statisticians are able to obtain accurate information about a group of people or things by surveying a sample, rather than the whole group. For example, television rating services ask only a few thousand families, rather than all viewers, what programs they watch. Statisticians decide where to get the data, determine the type and size of the sample group, and develop the survey questionnaire or reporting form. They also prepare instructions for workers who will tabulate the returns. Statisticians who design experiments prepare mathematical models to test a particular theory. Those in analytical work interpret collected data and summarize their findings in tables, charts, and written reports. Some statisticians, called mathematical statisticians, use mathematical theory to design and improve statistical methods.

Because the field of statistics has such a wide application, it is sometimes difficult to distinguish statisticians from specialists in other fields who use statistics. For example, a statistician working with data on economic conditions may have the title of economist.

Places of Employment

Approximately 24,000 persons—about one-third of them women—worked as statisticians in 1974.

About 2 out of 3 statisticians were in private industry, primarily in manufacturing, public utilities, finance, and insurance companies. Roughly one-eighth worked for the Federal Government, primarily in the Departments of Commerce; Agriculture; Defense; and Health, Education, and Welfare. Others worked in State and local government and colleges and universities.

Although statisticians work in all parts of the country, most are in metropolitan areas, and about one-fourth lived in three areas—New York City; Washington, D.C.; and Los Angeles-Long Beach, California.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in statistics or mathematics is the minimum educational requirement for many beginning jobs in statistics. For other beginning statistical jobs, however, a bachelor's degree with a major in an applied field such as economics or natural science and a minor in statistics is preferable. A graduate degree in mathematics or statistics is essential for college and university teaching and helpful for promotion to top administrative and consulting jobs.

About 120 colleges and universities offered statistics as a concentration for a bachelor's degree in 1974. Schools offer either a degree in mathematics or a sufficient number of courses in statistics to qualify graduates for beginning positions. Required subjects for statistics majors include mathematics through differential and integral calculus, statistical methods, and probability theory. Courses in computer uses and techniques are useful for many jobs. For quality control positions, training in engineering or a physical or biological science and in the application of statistical methods to manufacturing processes is desirable. For many market research, business analysis, and forecasting jobs, courses in economics and business administration are helpful.

Over 100 colleges and universities offered graduate degrees in statistics in 1974, and many other schools offered one or two graduate level statistics courses. The usual requirement for entering a graduate program is a bachelor's degree with a good background in mathematics.

Beginning statisticians who have only the bachelor's degree often spend much of their time performing routine work under the supervision of an experienced statistician. Through experience, they may advance to positions of greater technical and supervisory responsibility.

Employment Outlook

Employment opportunities for persons who combine training in statistics with knowledge of a field of application are expected to be favorable through the mid-1980's. Besides the faster than average growth expected in this field, additional statisticians will be needed to replace those who die, retire, or transfer to other occupations.

Private industry will require increasing numbers of statisticians for quality control in manufacturing. Statisticians with a knowledge of engineering and the physical sciences will find jobs working with scientists and engineers in research and development. Business firms will rely more heavily than in the past on statisticians to forecast sales, analyze business conditions, modernize accounting procedures, and help solve management problems.

Government agencies will need statisticians for existing and new programs in fields such as social security, health, education, and economics. Colleges and universities will employ others to teach a growing number of students, as the broader use of statistical methods makes such courses increasingly important to persons majoring in fields other than mathematics and statistics.

Earnings and Working Conditions

In 1974, the average salary of statisticians exceeded $21,000 a year, much higher than the average for all nonsupervisory workers in private industry, except farming. New college graduates averaged about $10,000 a year, according to the limited information available. Those with the master's degree could start at about $12,500 a year, while Ph. D. recipients could start at around $16,000.

In the Federal Government in 1974, statisticians who had the bachelor's degree and no experience could start at either $8,500 or $10,520 a year, depending on their college grades. Beginning statisticians with the master's degree could start at $12,841 or $15,481. Those with the Ph. D. could begin at $15,481 or $18,463.

Statisticians employed by colleges and universities generally receive salaries comparable to those paid other faculty members. (See statement on College and University Teachers.) In addition to their regular salaries, statisticians in educational institutions sometimes earn extra income from outside research projects, consulting, and writing.

Sources of Additional Information

For information about career opportunities in statistics, contact:

American Statistical Association, 806 15th St. NW., Washington, D.C. 20005.

Facts on Federal Government jobs are available from:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20414. For information on a career as a mathematical statistician, contact:

Institute of Mathematical Statistics, 1367 Laurel St., San Carlos, Calif. 94070.

PHYSICAL SCIENTISTS

Physical scientists deal with the basic principles of science. Many do basic research to increase man's knowledge of the properties of matter and energy. Others do basic and applied research, and develop new products and processes. For example, chemists in applied research use their knowledge of the interactions of various chemicals to improve the quality of products. Besides research and development, many physical scientists, particularly chemists and food scientists, work in production and sales-related activities in industry.

This section describes four physical science occupations—chemists, physicists, astronomers, and food scientists. Engineers, life scientists, and environmental scientists also require a background in the physical sciences; these occupations are described in separate sections elsewhere in this book.

ASTRONOMERS

(D.O.T.021.088)

Nature of the Work

Astronomers seek answers to questions about the fundamental nature of the universe, such as its origin and history and the evolution of our solar system. Astronomers—sometimes called *astrophysicists*—use the principles of physics and mathematics to study and determine the behavior of matter and energy in distant galaxies. One application of the information they gain is to prove or disprove theories of the nature of matter and energy such as Einstein's theory of relativity.

To make observations of the universe, astronomers use large telescopes, radiotelescopes, and other instruments which can detect electromagnetic radiation from distant sources. Astronomers of today spend little time visually observing stars through telescopes because photographic and electronic light detecting equipment is more effective with dim or distant stars and galaxies. By using spectroscopes to analyze light from stars astronomers can determine their chemical composition. Astronomers also use radiotelescopes and other electronic means to observe radio waves, X-rays, and cosmic rays. Electronic computers are used to analyze data and to solve complex mathematical equations that astronomers develop to represent various theories. Computers also are useful for processing astronomical data to calculate orbits of asteroids or comets, guide spacecraft, and work out tables for navigational handbooks.

Astronomers usually specialize in one of the many branches of the science such as instruments and techniques, the sun, the solar system, and the evolution and interiors of stars.

Astronomers who work on observational programs begin their studies by deciding what stars or other objects to observe and the methods and instruments to use. They may need to design optical measuring devices to attach to the telescope to make the required measurements. After completing their observations, they analyze the results, present them in precise numerical form, and explain them on the basis of some theory. Astromomers usually spend relatively little time in actual observation and relatively more time in analyzing the large quantities of data that observatory facilities collect.

Some astronomers concentrate on theoretical problems and seldom visit observatories. They formulate theories or mathematical models to explain observations made earlier by other astronomers. These astronomers develop mathematical equations using the laws of physics to compute, for example, theoretical models of how stars change as their nuclear energy sources become exhausted.

Almost all astronomers do research or teach; those in colleges and universities often do both. In schools that do not have separate departments of astronomy or only small enrollments in the subject, they often teach courses in mathematics or physics as well as astronomy. Some astronomers administer research programs, develop and design astronomical instruments, and do consulting work.

Places of Employment

Astronomy is the smallest physical science; only 2,000 persons, roughly 7 percent of them women, worked as astronomers in 1974. Most astronomers work in colleges and universities. Some work in observatories operated by universities, nonprofit organizations, or the Federal Government.

The Federal Government employed almost 600 astronomers in 1974. Most worked for the National Aeronautics and Space Administration. Others worked for the Department of Defense, mainly at the U.S. Naval Observatory and the U.S. Naval Research Laboratory. A few astronomers worked for firms in the aerospace field, or in museums and planetariums.

Training, Other Qualifications, and Advancement

The usual requirement for a job in astronomy is a Ph.D. degree. Persons with less education may qualify for some jobs; however, high-level positions in teaching and research and advancement in most areas are open only to those with the doctorate.

Many students who undertake graduate study in astronomy have a bachelor's degree in astronomy. In 1974, about 50 colleges and universities had programs leading to the bachelor's degree in astronomy. However, most students with a

Astronomer records data collected by a radio telescope.

bachelor's degree in physics, or in mathematics with a physics minor, can usually qualify for graduate programs in astronomy. Students planning to become astronomers usually study physics, mathematics, and chemistry. Courses in statistics, computer science, optics, and electronics also are useful. In schools with astronomy departments, students also take introductory courses in astronomy and astrophysics, and in astronomical techniques and instruments.

About 55 universities offer the Ph. D. degree in astronomy. These programs include advanced courses in astronomy, physics, and mathematics. Some schools require that graduate students spend several months working at an observatory. In most institutions, the work program leading to the doctorate is flexible and allows students to take courses in their own particular area of interest.

Persons planning careers in astronomy should have imagination and an inquisitive mind. Perseverance and the ability to concentrate on detail and to work independently also are important.

New graduates with a bachelor's or master's degree in astronomy usually begin as assistants in observatories, planetariums, large departments of astronomy in colleges and universities, Government agencies, or industry. Some work as research assistants while studying toward advanced degrees. New graduates with the doctorate can qualify for teaching and research jobs in colleges and universities and for research jobs in Government and industry.

Employment Outlook

Persons seeking positions as astronomers will face keen competition for the few available openings expected through the mid-1980's. Employment of astronomers is expected to grow slowly, if at all, because the funds available for basic research in astronomy, which come mainly from the Federal Government, are not expected to increase enough to create many new positions. Most openings will occur as replacements for those who die or retire. Since astronomy is such a small profession, there will be few openings needed for replacements. There will be a large number of people competing to fill these openings because the number of degrees granted in astronomy probably will continue to exceed available openings.

Earnings and Working Conditions

Astronomers have relatively high salaries, with average earnings much higher than the average for nonsupervisory workers in private industry, except farming.

In the Federal Government in late 1974, astronomers holding the Ph. D. degree could begin at $15,481 or $18,463, depending on their college record. Those having the bachelor's degree could start at $8,500 or $10,520; with the master's degree at $10,520 or $12,841. The average annual salary for astronomers and space scientists in the Federal Government was about $27,600 in late 1974. Astronomers teaching in colleges and universities received salaries equivalent to those of other faculty members. (See statement on College and University Teachers elsewhere in this book.)

Most astronomers spend most of their time working in offices or classrooms, although astronomers who make observations may need to travel to the observing facility and may occasionally work at night.

Sources of Additional Information

For information on careers in astronomy and on schools offering training in the field, contact:

American Astronomical Society, 211 Fitz-Randolph Rd., Princeton, N.J. 08540.

CHEMISTS

(D.O.T. 022.081, .168, .181, and.281)

Nature of the Work

The clothes we wear, the foods we eat, the houses in which we live—in fact most things that help make our lives better, from medical care to a cleaner environment—result, in part, from the work done by chemists.

Chemists search for and put into practical use new knowledge about substances. They develop new compounds, such as rocket fuel; improve foods; and create clothing that is chemically treated against flammability, soil, and wrinkles.

Over one-half of all chemists work in research and development. In basic research, chemists investigate the properties and composition of matter and the laws that govern the combination of elements. Basic research often has practical uses. For example, synthetic rubber and plastics have resulted from research on small molecules uniting to form larger ones (polymerization). In research and development, new products are created or improved. The process of developing a product begins with descriptions of needed items. If similar products exist, chemists test samples to determine their ingredients. If no such product exists, experimentation with various substances yields a product with the required specifications.

Nearly one-fifth of all chemists work in production and inspection. In production, chemists prepare instructions (batch sheets) for plant workers which specify the kind and amount of ingredients to use and the exact mixing time for each stage in the process. At each step, samples are tested for quality control to meet industry and government standards. Records and reports show results of tests.

Chemists study model of ethylene dinitramine.

Others work as marketing or sales representatives to obtain technical knowledge of products sold. A number of chemists teach in colleges and universities. Some chemists are consultants to private industry and government agencies.

Chemists often specialize in one of the subfields of chemistry. *Analytical chemists* determine the structure, composition, and nature of substances, and develop new techniques. An outstanding example was the analysis of moon rocks by an international team of analytical chemists. *Organic chemists* originally studied the chemistry of living things, but this area has been broadened to include all carbon compounds. When combined with other elements, carbon forms an incredible variety of substances. Many modern commercial products, including plastics and other synthetics, have resulted from this work. *Inorganic chemists* study compounds other than carbon. They may develop, for example, materials to use in solid state electronic components. *Physical chemists* study energy transformations to find new and better energy sources. Increasingly, however, chemists consider themselves members of new specialties which include two of the preceding fields or more. *Biochemists*, often considered as either chemists or life scientists, are discussed elsewhere in this book. Some chemists specialize in the chemistry of foods. (See statement on Food Scientists elsewhere in this book.)

Places of Employment

Nearly 135,000 persons worked as chemists in 1974; about 10 percent were women. Nearly three-fourths of all chemists work in private industry; almost one-half are in the chemicals manufacturing industry. Most others work for companies manufacturing food, scientific instruments, petroleum, paper, and electrical equipment.

Colleges and universities employed 25,000 chemists. Smaller numbers worked for nonprofit research organizations; and State and local governments, primarily in health and agriculture; Federal agencies, chiefly the Departments of Defense; Health, Education, and Welfare; Agriculture; and Interior.

Chemists are employed in all parts of the country, but they are concentrated in large industrial areas. Nearly one-fifth of all chemists were located in four metropolitan areas—New York, Chicago, Philadelphia, and Newark. About half of the total worked in six States—New York, New Jersey, California, Pennsylvania, Ohio, and Illinois.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in chemistry or a related discipline is sufficient for many beginning jobs as a chemist. However, graduate training is required for many research and college teaching positions. Beginning chemists should have a broad background in chemistry, with good laboratory skills.

Over 1,100 colleges and universities offer a bachelor's degree in chemistry. In addition to required courses in analytical, inorganic, organic, and physical chemistry, undergraduates usually study mathematics and physics.

More than 350 colleges and universities award advanced degrees in chemistry. In graduate school, students generally specialize in a particular subfield of chemistry. Requirements for the master's and doctor's degree usually include a thesis based on independent research.

Students planning careers as chemists should enjoy studying science and mathematics, and should like working with their hands building scientific apparatus and performing experiments. Perseverance and the ability to concentrate on detail and work independently are essential. Other desirable assets include an inquisitive mind, and imagination. Chemists also should have good eyesight and eye-hand coordination.

Graduates with the bachelor's degree generally begin their careers in government or industry by analyzing or testing products, working in technical sales or service, or assisting senior chemists in research and development laboratories. Many employers have special training and orientation programs which are concerned with the special knowledge needed for the employer's type of work. Candidates for an advanced degree often teach or do research in colleges and universities while working toward advanced degrees.

Beginning chemists with the master's degree can usually go into applied research in government or private industry. They also may qualify for teaching positions in 2-year colleges, and some universities.

The Ph. D. generally is required for basic research, for teaching in colleges and universities, and for advancement to many administrative positions.

Employment Outlook

Employment opportunities in chemistry are expected to be good for graduates at all degree levels through the mid-1980's. The employment of chemists is expected to grow faster than the average for all occupations during this period; thousands of new jobs will be created each year. In addition, several thousand openings will result each year as chemists retire, die, or transfer to other occupations.

The outlook for chemists is based on the assumption that research and development expenditures of government and industry will increase through the mid-1980's, although at a slower rate than during the 1960's. If actual R&D expenditures levels differ significantly from those assumed, the outlook for chemists would be altered.

Approximately three-fourths of total employment is expected to be in private industry to develop new products. In addition, industrial companies and government agencies will need chemists to help solve problems related to energy shortages, pollution control, and health care. Some also will work in Federal, State, and local crime laboratories.

Growth in college and university employment is expected to be much slower than in the past; competition for teaching positions will be keen. (See statement on College and University Teachers elsewhere in this book.)

New graduates also will find openings in high school teaching after completing professional education courses and other requirements for a State teaching certificate. However, they usually are then regarded as teachers rather than chemists. (See statement on Secondary School Teachers elsewhere in this book.)

Earnings and Working Conditions

Chemists averaged more than

Chemist regulates the pressure of a gas used in an experiment.

twice as much as nonsupervisory workers in private industry, except farming. According to the American Chemical Society, experienced chemists having a bachelor's degree averaged $17,500 a year in 1974; for those with a master's degree, $18,400; and for those with a Ph. D., $21,700.

Private industry paid chemists with the bachelor's degree starting salaries averaging $10,200 a year in 1974; those with the master's degree, $12,000; and those with the Ph. D., $16,800.

In colleges and universities, the median salary of those with the master's degree was $13,300 and of those with the Ph. D., $17,200. In addition, many experienced chemists in educational institutions supplement their regular salaries with income from consulting, lecturing, and writing.

Depending on college records, the annual starting salary in the Federal Government in late 1974 for an inexperienced chemist with a bachelor's degree was either $8,500 or $10,520. Those who had 2 years of graduate study could begin at $12.841 a year. Chemists having the Ph. D. degree could start at $15,841 or $18,463. The average salary for all chemists in the Federal Government in late 1974 was $21,500 a year.

Chemists usually work in modern, well-equipped, and well-lighted laboratories, offices, or classrooms. Hazards involve handling potentially explosive or highly caustic chemicals. However, when safety regulations are followed, health hazards are negligible.

Sources of Additional Information

General information on career opportunities and earnings for chemists is available from:

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.

Manufacturing Chemists Association, Inc., 1825 Connecticut Ave. NW., Washington, D.C. 20009.

For specific information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

For additional sources of information, see statements on Biochemists and Chemical Engineers. Information on chemical technicians may be found in the statement on Engineering and Science Technicians.

FOOD SCIENTISTS

(D.O.T. 022.081, 040.081, and 041.081)

Nature of the Work

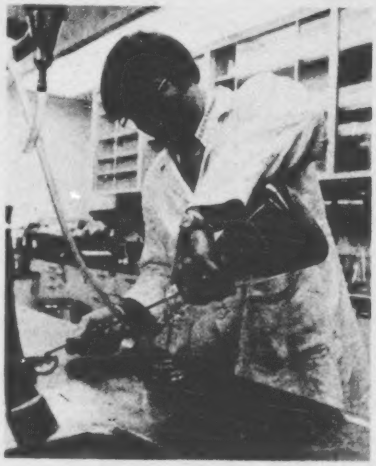
In the past, consumers processed most food in the home, but today, industry processes almost all foods. A keyworker involved in the development and processing of the large variety of foods available today is the *food scientist* or *food technologist*.

Food scientists investigate the chemical, physical, and biological nature of food and apply this knowledge to processing, preserving, packaging, distributing, and storing an adequate, nutritious, wholesome, and economical food supply. About three-fifths of all scientists in food processing work in research and development. Others work in quality assurance laboratories or in production or processing areas of food plants. Some teach or do basic research in colleges and universities.

Food scientists in basic research study the structure and composition of food and the changes it undergoes in storage and processing. For example, they may develop new sources of proteins, study the effects of processing on microorganisms, or search for factors that affect the flavor, texture, or appearance of foods. Food scientists who work in applied research and development create new foods and develop new processing methods. They also seek to improve existing foods by making them more nutritious and enhancing their flavor, color, and texture.

Food scientists insure that each product will retain its characteristics and nutritive value during storage. They also conduct chemical and microbiological tests to see that products meet industry and government standards, and they may determine the nutritive contents of products in order to comply with Federal nutritional labeling requirements.

In quality control laboratories, food scientists check raw ingredients for freshness, maturity, or suitability for processing. They may use machines that test for tenderness by finding the amount of force necessary to puncture the item. Periodically, they inspect processing line operations to insure conformance with government and industry standards. For example, scientists test canned goods for sugar, starch, protein, fat, vitamin, and mineral content. In frozen food plants, they make sure that, after processing, various enzymes are in-



Food scientist does research to develop new food product.

active so that the food will not spoil during storage. Other food scientists are involved in developing and improving packaging and canning methods.

Food scientists in production prepare production specifications, schedule processing operations, maintain proper temperature and humidity in storage areas, and supervise sanitation operations, including the efficient and economical disposal of wastes. To increase efficiency, they advise management on the purchase of equipment and recommend new sources of materials.

Some food scientists apply their knowledge in areas such as market research, advertising, and technical sales. Others teach in colleges and universities.

Places of Employment

About 7,200 persons—more than 10 percent of them women—worked as food scientists in 1974. Food scientists work in all sectors of the food industry and in every State. The types of products on which they work may depend on the locality: for example, in Maine and Idaho they work with potato processing; in the Midwest, with cereal products and meatpacking; and in Florida and California, with orange juice concentrates.

Some food scientists do research for Federal agencies such as the Food and Drug Administration and the Departments of Agriculture and Defense; others work in State regulatory agencies. A few work for private consulting firms and international organizations such as the United Nations. Some teach or do research in colleges and universities. (See statement on College and University Teachers elsewhere in this book.)

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in food science, or in one of the physical or life sciences such as chemistry and biology, is the usual minimum requirement for beginning jobs in food science. An advanced degree is necessary for many jobs, particularly research and college teaching, and for some management level jobs in industry.

About 60 colleges and universities offered programs leading to the bachelor's degree in food science in 1974; the Institute of Food Technologists approved over 40 of these. Undergraduate students majoring in food science usually take courses in physics, chemistry, mathematics, biology, the social sciences and humanities, and business administration, as well as a variety of food science courses. Food science courses cover areas such as preservation, processing, sanitation, and marketing of foods.

Most of the colleges and universities that provide undergraduate food science programs also offer advanced degrees. Graduate students usually specialize in a particular area of food science. Requirements for the master's or doctor's degree vary by institution, but usually include laboratory work and a thesis.

Young people planning careers as food scientists should have analytical minds and like details and technical work. Food scientists must be able to express their ideas clearly to others.

Food scientists with a bachelor's degree might start work as quality assurance chemists or as assistant production managers. After gaining experience, they can advance to more responsible management jobs. A food scientist might also begin as a junior food chemist in a research and development laboratory of a food company, and be promoted to section head or another research management position.

People who have master's degrees may begin as senior food chemists in a research and development laboratory. Those who have the Ph. D. degree usually begin their careers doing basic research or teaching.

Employment Outlook

Employment of food scientists is expected to grow faster than the average for all occupations through the mid-1980's. In addition to openings resulting from this growth, some jobs will open each year because of the need to replace those who die, retire, or transfer to other fields.

Employment is expected to grow as the food industry responds to the challenge of providing wholesome and economical foods that can meet changing consumer preferences and food standards. In addition, both private households and food service institutions that supply outlets such as airlines and restaurants will demand a greater quantity of quality convenience foods.

Food scientists with advanced degrees are expected to have more favorable opportunities than those with only the bachelor's degree. Also, those with degrees in food science may have better opportunities than those with degrees in related fields such as chemistry or biology.

An increasing number of food scientists are expected to find jobs in research and product development. In recent years, expenditures for research and development in the food industry have increased moderately and probably will continue to rise. Through research, new foods are being produced from modifications of wheat, corn, rice, and soybeans. For example, food scientists are working to improve "meat" products made from vegetable proteins. There will be an increased need for food scientists in quality control and production because of the complexity of products and processes and the application of higher processing standards and new government regulations.

Earnings and Working Conditions

Food scientists had relatively high earnings in 1974, much higher than the average for all nonsupervisory workers in private industry, except farming. Food scientists with the bachelor's degree had average starting salaries of about $10,000 a year in 1974. Those with a master's degree started at about $12,000, and those with the Ph. D. degree at about $15,200.

In the Federal Government in late 1974, food scientists with a bachelor's degree could start at $8,500 or $10,520 a year, depending on their college grades. Those with a master's degree could start at $10,520 or $12,841, and those with the Ph. D. degree could begin at $15,481 or $18,463. The average salary for experienced food scientists in the Federal Government was about $22,500 a year in late 1974.

Sources of Additional Information

For information on careers in food science, contact:

Institute of Food Technologists, Suite 2120,
221 North LaSalle St., Chicago, Ill.
60601.

PHYSICISTS

(D.O.T. 023.081 and.088)

Nature of the Work

The flight of astronauts through space, the probing of ocean depths, or even the safety of the family car depend on research by physicists. Through systematic observation and experimentation, physicists describe in mathematical terms the structure of the universe and interaction of matter and energy. Physicists develop theories that describe the fundamental forces and laws of nature. Determining such basic laws governing phenomena such as gravity, electromagnetism, and nuclear interaction leads to discoveries and innovations. For instance, the development of irradiation therapy equipment which destroys harmful growths in humans without damaging other tissues resulted from what physicists know about nuclear radiation. Physicists have contributed to scientific progress in recent years in areas such as nuclear energy, electronics, communications, aerospace, and medical instrumentation.

Two-thirds of all physicists work in research and development. Some do basic research to increase scientific knowledge. For example, they investigate the fundamentals of nuclear structure and the forces between nucleons (nuclear dynamics). The equipment that physicists develop for their basic research can often be applied to other areas. For example, lasers (devices which amplify light and emit electromagnetic waves in a narrow, intense light beam) are utilized in surgery; microwave devices are used for ovens; and measurement techniques and instruments developed by physicists can detect and measure the kind and number of cells in blood or the amount of mercury or lead in foods.

Some engineering-oriented physicists do applied research and help develop new products. For instance, their knowledge of solid-state physics led to the development of transistors and microcircuits used in electronic equipment that ranges from hearing aids to missile guidance systems.

Many physicists teach in colleges and universities. A small number work in inspection, quality control, and other production-related jobs in industry. Some do consulting work.

Most physicists specialize in one or more branches of the science—elementary-particle physics; nuclear physics; atomic, electron, and molecular physics; physics of condensed matter; optics, acoustics, and plasma physics; and the physics of fluids. Some specialize in a subdivision of one of these branches. For example, within solid-state physics subdivisions include ceramics, crystallography, and semiconductors. However, since all physics specialties rest on the same fundamental principles, a physicist's work usually overlaps many specialties.

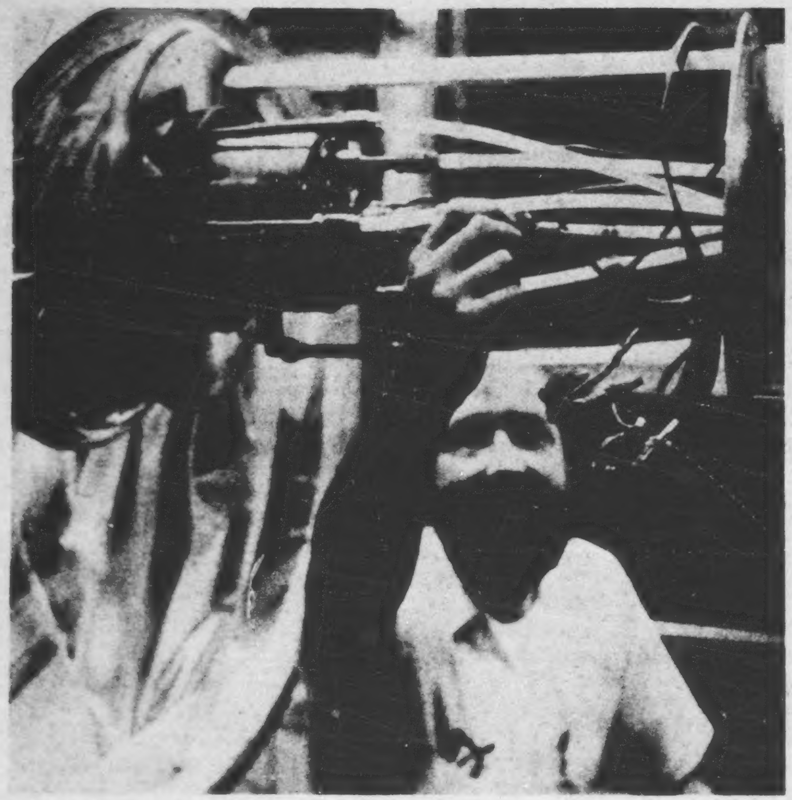
Growing numbers of physicists are specializing in fields combining physics and a related science—such as astrophysics, biophysics, chemical physics, and geophysics. Furthermore, the practical applications of physicists' work have increasingly merged with engineering.

Places of Employment

About 48,000 people worked as physicists in 1974; about 4 percent were women. Private industry employed over 19,000; almost two-fifths of these were in companies manufacturing chemicals, electrical equipment, and ordnance products. Commercial laboratories and independent research organizations employ more than one-fourth of the physicists in private industry.

Nearly 21,000 physicists taught or did research in colleges and universities; some did both. About 6,200 physicists were in the Federal Government in 1974, mostly in the Departments of Defense and Commerce. About 1,300 physicists worked in nonprofit organizations.

Although physicists are employed in all parts of the country, their employment is greatest in areas that have heavy industrial concentrations and large college and university enrollments. Nearly one-fourth of all physicists work in four metropolitan areas—Washington, D.C.; Boston, Mass.; New York, N.Y.; and Los Angeles-Long Beach, Calif., and more than one-third are concentrated in three



Physicists develop equipment used in cancer research.

States—California, New York, and Massachusetts.

Training, Other Qualifications, and Advancement

Graduate training in physics or a closely related field is almost essential for most entry level jobs in physics and for advancement in all types of work. The doctorate is usually required for full faculty status at colleges and universities and for industrial or government jobs administering research and development programs.

Those having master's degrees qualify for many research jobs in private industry and in the Federal Government. Some work in colleges and universities, instructing and assisting in research while studying for their Ph.D.

Those having bachelor's degrees qualify for some applied research and development jobs in private industry and in the Federal Government. Some are employed as research assistants in colleges and universities while studying for advanced degrees. Many with a bachelor's degree in physics apply their physics training in jobs in other scientific fields and in engineering. (See statements on Engineers, Geophysicists, Programmers, and Systems Analysts elsewhere in this book.)

About 900 colleges and universities offer a bachelor's degree in physics. In addition, many engineering schools offer a physics major as part of the general curriculum. The undergraduate program in physics provides a broad background in the science and serves as a base for later specialization either in graduate school or on the job. Some typical physics courses are mechanics, electricity and magnetism, optics, thermodynamics, and atomic and molecular physics. Students also take courses in chemistry and mathematics.

Almost 300 colleges and universities offer advanced degrees in physics. In graduate school, the student, with faculty guidance, usually works in a specific field. The graduate student, especially the candidate for the Ph. D. degree, spends a large portion of his time in research.

Students planning a career in physics should have an inquisitive mind, mathematical ability, and imagination. They should be able to work on their own, since physicists, particularly in basic research, often receive only limited supervision.

Young physicists often begin their careers doing routine laboratory tasks. After some experience, they are assigned more complex tasks and may advance to work as project leaders or research directors. Some work in top management jobs. Physicists who develop new products frequently form their own companies or join new firms to exploit their own ideas.

Employment Outlook

Employment opportunities in physics are expected to be good through the mid-1980's. The employment of physicists is expected to grow faster than the average for all occupations over this period, creating more than a thousand new openings each year. In addition, some openings will result as physicists retire, die, or transfer to other occupations.

Some of the past growth in employment of physicists resulted from increases in Federal research and development (R&D) expenditures. Through the mid-1980's, government R&D expenditures are expected to increase, although at a slower rate than during the 1960's. On this basis, more physicists will continue to be required. However, if actual R&D expenditure levels and patterns were to differ significantly from those assumed, the outlook for physicists would be altered.

Some physicists with advanced degrees will be needed to teach in colleges and universities, but competition for these jobs is expected to be keen.

New graduates also will find opportunities as high school physics teachers after completing the required educational courses and obtaining a State teaching certificate. However, they are usually regarded as teachers rather than as physicists. (See statement on Secondary School Teachers elsewhere in this book.)

Earnings and Working Conditions

Physicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming. Starting salaries for physicists who had a bachelor's degree averaged about $10,700 a year in manufacturing industries in 1974; a master's degree, $12,800; and a Ph. D., $17,800.

Depending on their college records, physicists with a bachelor's degree could start in the Federal Government in late 1974 at either $8,500 or $10,520 a year. Beginning physicists having a master's degree could start at $10,520 or $12,841, and those having the Ph. D. degree could begin at $15,481 or $18,463. Average earnings for all physicists in the Federal Government in 1974 were $24,700 a year.

Starting salaries on college and university faculties for physicists having a master's degree averaged $9,600 in 1973, and for those having the Ph. D., $12,000. (See statement on College and University Teachers elsewhere in this book.) Many faculty physicists supplement their regular incomes by working as consultants and taking on special research projects.

Sources of Additional Information

General information on career opportunities in physics is available from:

American Institute of Physics, 335 East 45th St., New York, N.Y. 10017.

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

OTHER SCIENTIFIC AND TECHNICAL OCCUPATIONS

BROADCAST TECHNICIANS

(D.O.T. 194.168, .281, .282, and
782; 957.282; and 963.168
through .887)

Nature of the Work

Broadcast technicians operate and maintain the electronic equipment used to record and transmit radio and television programs. They work with microphones, sound recorders, light and sound effects, television cameras, video tape recorders, and other equipment.

In the control room, broadcast technicians operate equipment that regulates the quality of sounds and pictures being recorded or broadcast. They also operate controls that switch broadcasts from one camera or studio to another, from film to live programming, or from network to local programs. By means of hand signals and, in television, by use of telephone headsets, they give technical directions to personnel in the studio.

When events outside the studios are to be broadcast, technicians may go to the site and set up, test, and operate the equipment. After the broadcast, they dismantle the equipment and return it to the station.

As a rule, broadcast technicians in small stations perform a variety of duties. In large stations and in networks, on the other hand, technicians are more specialized, although specific job assignments may change from day to day. *Transmitter technicians* monitor and log outgoing signals and are responsible for transmitter operation. *Maintenance technicians* set up, maintain, and repair electronic broadcasting equipment. *Audio control technicians* regulate sound pickup, transmission, and switching and *video control technicians* regulate the quality, brightness, and contrast of television pictures. The lighting of television programs is directed by *lighting technicians*. For programs originating outside the studio, *field technicians* set up and operate broadcasting equipment. *Recording technicians* operate and maintain sound recording equipment; *video recording technicians* operate and maintain video tape recording equipment. Sometimes the term "engineer" is substituted for "technician."

Places of Employment

About 22,000 broadcast technicians were employed in radio and television stations in 1974. Most radio stations employ fewer than 4 technicians, although a few large ones have more than 10. Nearly all television stations employ at least 10 broadcast technicians, and those in large metropolitan areas average about 30. In addition to the technicians, some supervisory personnel, with job titles such as chief engineer or director of engineering, work in technical departments.

Although broadcast technicians are employed in every State, most are located in large metropolitan areas. The highest paying and most specialized jobs are concentrated in New York, Los Angeles, and Washington, D.C.—the originating centers for most of the network programs.

Training, Other Qualifications, and Advancement

Broadcast technician gives technical assistance to studio personnel.

A person interested in becoming a broadcast technician should plan to get a Radiotelephone First Class Operator License from the Federal Communications Commission (FCC). Federal law requires that anyone who operates broadcast transmitters in television and radio stations must hold such a license. The FCC also issues a Third Class Operator License which is all that is needed to operate a radio broadcast transmitter. Some stations require all their broadcast technicians, including those who do not operate transmitters, to have one of these licenses. In addition, the chief engineer of each broadcasting station must have an FCC Radiotelephone First Class Operator License. Applicants for these licenses must pass a series of written examinations. These cover construction and operation of transmission and receiving equipment; characteristics of electromagnetic waves; and regulations and practices, both Federal Government and international, which govern broadcasting.

Among high school courses, algebra, trigonometry, physics, electronics, and other sciences provide valuable background for persons anticipating careers in this occupation. Building and operating an amateur radio station also is good training. Taking an electronics course in a technical school is still another good way to acquire the knowledge for becoming a broadcast technician. Some persons gain work experience as temporary employees while filling in for regular broadcast technicians who are on vacation.

Many schools give courses especially designed to prepare the student for the FCC's first-class license test. Technical school or college training is an advantage for those who hope to advance to supervisory positions or to the more specialized jobs in large stations and in the networks.

Persons with FCC first-class licenses who get entry jobs are instructed and advised by the chief engineer or by other experienced technicians concerning the work procedures of the station. In small stations, they may start by operating the transmitter and handling other technical duties, after a brief instruction period. As they acquire more experience and skill they are assigned to more responsible jobs. Those who demonstrate above-average ability may move into top-level technical positions, such as supervisory technician or chief engineer. A college degree in engineering is becoming increasingly important for advancement to supervisory and executive positions.

Employment Outlook

The number of broadcast technicians is expected to increase about as fast as the average for all occupations through the mid-1980's. Most job openings will result from the need to replace experienced technicians who retire, die, or transfer to other occupations.

Some new job opportunities for technicians will be provided as new radio and television stations go on the air. Demand for broadcast technicians also will increase as cable television stations broadcast more of their own programs. However, laborsaving technical advances, such as automatic programming, automatic operation logging, and remote control of transmitters will limit the demand for technicians.

Earnings and Working Conditions

Salaries of beginning technicians in commerical radio and television ranged from about $135 to $185 a week in 1974 and those of experienced technicians from about $170 to $350, according to the limited information available. As a rule, technicians' wages are highest in large cities and in large stations. Technicians employed by television stations usually are paid more than those who work for radio stations because television work is generally more complex. Technicians employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most technicians in large stations work a 40-hour week with overtime pay for additional hours. Some broadcast technicians in the larger cities work a 37-hour week. In small stations, many technicians work 4 to 12 hours of overtime each week. Evening, night, and weekend work frequently is necessary since many stations are on the air as many as 24 hours a day, 7 days a week. Network technicians may occasionally have to work continuously for many hours and under great pressure in order to meet broadcast deadlines.

Technicians generally work indoors in pleasant surroundings. The work is interesting, and the duties are varied. When remote pickups are made, however, technicians may work out of doors at some distance from the studios, under less favorable conditions.

Sources of Additional Information

For information about radiotelephone operator's examinations, and guides to study for them, write to:

Federal Communications Commission,
Washington, D.C. 20036.

For information on careers for broadcast technicians, write to:

National Association of Broadcasters, 1771
N St. NW., Washington, D.C. 20036.

Corporation for Public Broadcasting, 888
16th St. NW., Washington, D.C. 20006.

DRAFTERS

(D.O.T. 001.281, 002.281, 003.281, 005.281, 007.281, 010.281, 014.281, and 017.)

Nature of the Work

When making a space capsule, television set, building, or bridge, workers follow drawings that show the exact dimensions and specifications of the entire object and each of its parts. Workers who draw these plans are drafters.

Drafters prepare detailed drawings based on rough sketches, specifications, and calulations made by engineers, architects, and designers. They also calculate the strength, quality, quantity, and cost of materials. Final drawings contain a detailed view of the object as well as specifications for materials to be used, procedures followed, and other information to carry out the job.

In preparing drawings, drafters use compasses, dividers, protractors, triangles, and machines that combine the functions of several devices. They also use engineering handbooks, tables, and slide rules to help solve technical problems.

Drafters are classified according to the work they do or their level of responsibility. *Senior drafters* translate an engineer's or architect's preliminary plans into design "layouts" (scale drawings of the object to be built). *Detailers* draw each part shown on the layout, and give dimensions, materials, and other information to make the detailed drawing clear and complete. *Checkers* carefully examine drawings for errors in computing or recording dimensions and specifications. Under the supervision of drafters, *tracers* make minor corrections and trace drawings for reproduction on paper or plastic film.

Drafters may specialize in a particular field of work, such as mechanical, electrical, electronic, aeronautical, structural, or architectural drafting.

Places of Employment

About 313,000 persons—8 percent of them women—worked as drafters in 1974. More than 9 out of 10 drafters worked in private industry, with engineering and architectural firms employing almost 30 percent of all drafters. Other major employers included the fabricated metals, electrical equipment, and construction industries.

About 20,000 drafters worked for Federal, State, and local governments in 1974. Most drafters in the Federal Government worked for the Defense Department; those in State and local governments were mainly in highway and public works departments. Another several thousand drafters worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Persons interested in becoming drafters can acquire the necessary training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools. It is also possible to qualify through on-the-job training programs combined with part-time schooling or 3- to 4-year apprenticeship programs.

Training for a career in drafting, whether in a high school or post-high school program, should include courses in mathematics, physical sciences, mechanical drawing, and drafting. Shop practices and shop skills also are helpful since many higher level drafting jobs require knowledge of manufacturing or construction methods. Many technical schools offer courses in structural design, strength of materials, and metal technology.

Those planning careers in drafting should be able to do detailed work requiring a high degree of accuracy; have good eyesight and eye-hand coordination because most of their work is done at the drawing board; be able to function as part of a team since they work directly with engineers, architects, and skilled workers; and be able to do freehand drawings of three-dimensional objects. Artistic ability is helpful in some specialized fields.

High school graduates usually start out as tracers. Those having post-high school technical training usually qualify as junior drafters. After gaining experience, they may advance to checkers, detailers, senior drafters, or supervisors. Some may become independent designers. Courses in engineering and mathematics sometimes enable drafters to transfer to engineering positions.

Drafter prepares final specifications for highway project.

Employment Outlook

Employment of drafters is expected to increase faster than the average for all occupations. This growth, along with the need to replace those who retire, die, or move into other fields of work, should provide favorable job opportunities through the mid-1980's. Holders of an associate (2-year) degree in drafting will have the best prospects. Many large employers already require post-secondary technical education, though well-qualified high school graduates who have studied drafting will find opportunities in some types of jobs.

Employment of drafters is expected to rise rapidly as a result of the increasingly complex design problems of modern products and processes. In addition, more drafters will be needed as supporting personnel for engineering and scientific occupations. Photoreproduction of drawings and expanding use of electronic drafting equipment and computers, however, will reduce the need for less skilled drafters.

Earnings

In private industry, beginning drafters earned between $560 and $740 a month in 1974; more experienced drafters earned from $700 to $900 a month. Senior drafters averaged roughly $1,000 a month, about one and one-half times as much as the average earnings of nonsupervisory workers in private industry, except farming.

The Federal Government paid drafters having an associate degree starting salaries of $7,596 a year in late 1974. Those with less education and experience generally started at $6,764. The average Federal Government salary for all drafters was $10,400 a year.

Sources of Additional Information

General information on careers for drafters is available from:

American Institute for Design and Drafting, 3119 Price Rd., Bartlesville, Okla. 74003.

International Federation of Professional and Technical Engineers, 1126 16th St. NW., Washington, D.C. 20036.

See Sources of Additional Information in the statement on Engineering and Science Technicians elsewhere in this book.)

ENGINEERING AND SCIENCE TECHNICIANS

(D.O.T. 002. through 029.)

Nature of the Work

Knowledge of science, mathematics, industrial machinery, and processes enables engineering and science technicians to work in all phases of production, from research and design to manufacturing, sales, and customer service. Although their jobs are more limited in scope and more practically oriented than those of engineers or scientists, technicians often do work that engineers or scientists might otherwise have to do. Technicians frequently use complex electronic and mechanical instruments, experimental laboratory equipment, and drafting instruments. Almost all technicians described in this statement must be able to use engineering handbooks and computing devices such as slide rules and calculating machines.

In research and development (R&D), one of the largest areas of employment, technicians set up, calibrate, and operate complex instruments, analyze data, and conduct tests. They also assist engineers and scientists in developing experimental equipment and models by making drawings and sketches; and under an engineer's direction they frequently do routine design work.

In production, technicians usually follow the plans and general directions of engineers and scientists, but often without close supervision. They may prepare specifications for materials, devise tests to insure product quality, or study ways to improve the efficiency of an operation. They often supervise production workers to make sure they follow prescribed plans and procedures. As a product is built, technicians check to see that specifications are followed, keep engineers and scientists informed as to progress, and investigate production problems.

As sales workers or field representatives for manufacturers, technicians give advice on installation and maintenance problems of complex machinery, and may write specifications and technical manuals. (See statement on Technical Writers elsewhere in this book.)

Technicians may work in the engineering field, in physical science, or in life science. Within these general fields, job titles may describe the level (biological aid or biological technician), duties (quality control technician or time study analyst), or area of work (mechanical, electrical, or chemical).

As an engineering technician, one might work in any of the following areas:

Aeronautical Technology. Technicians in this area work with engineers and scientists to design and produce aircraft, rockets, guided missiles, and spacecraft. Many aid engineers in preparing design layouts and models of structures, control systems, or equipment installations by collecting information, making computations, and performing laboratory tests. For example, under the direction of an engineer, a technician might estimate weight factors, centers of gravity, and other items affecting load capacity of an airplane or missile. Other technicians prepare or check drawings for technical accuracy, practicability, and economy.

Aeronautical technicians frequently work as manufacturers' field service representatives, serving as the link between their company and the military services, commercial airlines, and other customers. Technicians also prepare technical information for instruction manuals, bulletins, catalogs, and other literature. (See statement on Aerospace Engineers and Airplane Mechanics elsewhere in this book.)

Air-Conditioning, Heating, and Refrigeration Technology. Air conditioning, heating, and refrigeration technicians design, manufacture, sell, and service equipment to regulate interior temperatures. Technicians in this field often specialize in one area, such as refrigeration, and sometimes in a particular type of activity, such as research and development.

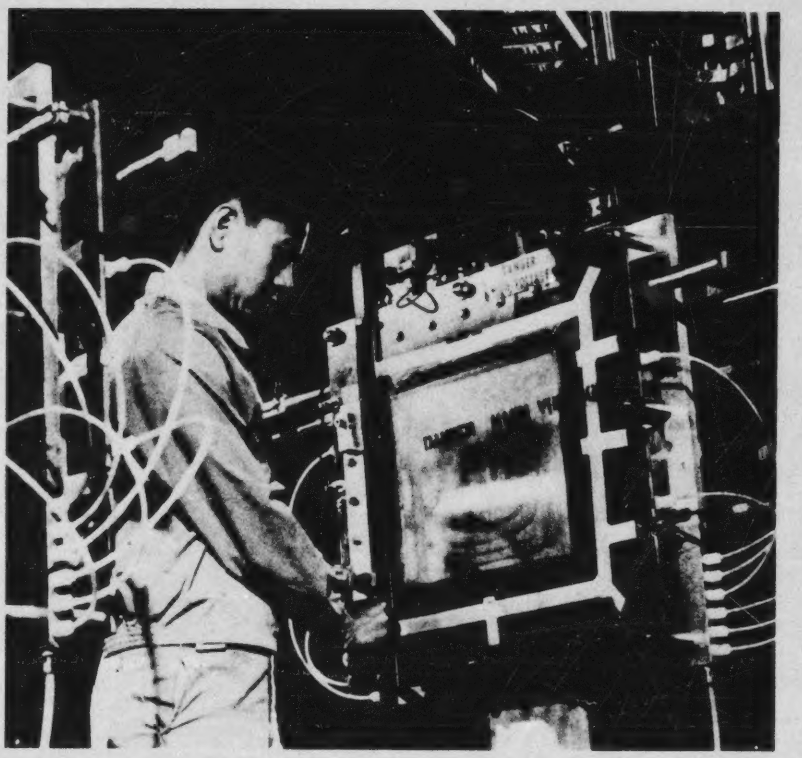
When working for firms that manufacture temperature controlling equipment, technicians generally work in research and engineering departments, where they assist engineers and scientists in the design and testing of new equipment or production methods. For example, a technician may construct an experimental model to test its durability and operating characteristics. Technicians also work as field salesworkers for equipment manufacturers or dealers, and must be able to supply engineering firms and other contractors that design and install systems with information on installation, maintenance, operating costs, and the performance specifications of the equipment. Other technicians work for contractors, where they help design and prepare installation instructions for air-conditioning, heating, or refrigeration systems. Still others work in customer service, and are responsible for supervising the installation and maintenance of equipment.

Civil Engineering Technology. Technicians in this area assist civil engineers in planning, designing, and constructing highways, bridges, dams, and other structures. During the planning stage, they help estimate costs, prepare specifications for materials, or participate in surveying, drafting, or designing. Once construction begins, they assist the contractor or superintendent in scheduling construction activities or inspecting the work to assure conformance to blueprints and specifications. (See statements on Civil Engineers, Drafters, and Surveyors elsewhere in this book.)

Electronics Technology. Technicians in this field develop, manufacture, and service a wide range of electronic equipment and systems. They may work with radio, radar, sonar, television, and other communication equipment, industrial and medical measuring or control devices, navigational equipment, electronic computers, and many other types of electronic equipment. Because the field is so broad, technicians often specialize in one area such as automatic control devices or electronic amplifiers. Furthermore, technological advancement is constantly opening up new areas of work. For example, the development of printed circuits stimulated the growth of miniaturized electronic systems.

When working in design, production, or customer service, electronic technicians use sophisticated measuring and diagnostic devices to analyze and test equipment. In many cases, they must understand the requirements of the field in which the electronic device is being used. In designing equipment for space exploration, for example, they must consider the need for minimum weight and volume and maximum resistance to shock, extreme temperature, and pressure. Some electronics technicians also work in technical sales, while others work in the radio and television broadcasting industry. (See statement on Broadcast Technicians elsewhere in this book.)

Industrial Production Technology. Technicians in this area, usually called industrial or production technicians, assist industrial engineers on problems involving the efficient use of personnel, materials, and machines to produce goods and services. They prepare layouts of machinery and equipment, plan the flow of work, make statistical studies, and analyze production costs. Industrial technicians also conduct time and motion studies (analyze the time and movements a worker needs to accomplish a task) to improve the efficiency of an operation.



Physics technician adjusts spark chamber during research experiment.

Many industrial technicians acquire work experience which enables them to qualify for other jobs. For example, those specializing in machinery and production methods may move into industrial safety. Others, in job analysis, may set job standards and interview, test, hire, and train personnel. Still others may move into production supervision. (See statements on Personnel Workers and Industrial Engineers elsewhere in this book.)

Mechanical Technology. Mechanical technology is a broad term which covers a large number of specialized fields including automotive technology, diesel technology, tool design, machine design, and production technology.

Technicians assist engineers in design and development work by making freehand sketches and rough layouts of proposed machinery and other equipment and parts. This work requires knowledge of mechanical principles involving tolerance, stress, strain, friction, and vibration factors. Technicians also analyze the costs and practical value of designs.

In planning and testing experimental machines and equipment for performance, durability, and efficiency, technicians record data, make computations, plot graphs, analyze results, and write reports. They sometimes recommend design changes to improve performance. Their job often requires skill in the use of instruments, test equipment and gauges, as well as in the preparation and interpretation of drawings.

When a product is ready for production, technicians help prepare layouts and drawings of the assembly process and of parts to be manufactured. They frequently help estimate labor costs, equipment life, and plant space. Some mechanical technicians test and inspect machines and equipment in manufacturing departments or work with engineers to eliminate production problems. Others are technical salesworkers.

Tool designers are among the better known specialists in mechanical engineering technology. Tool designers design tools and devices for mass production, and frequently redesign existing tools to improve their efficiency. They prepare sketches of the designs for cutting tools, jigs, dies, special fixtures, and other attachments used in machine operations. They also make or supervise others in making detailed drawings of tools and fixtures.

Machine drafting, with some designing, is another major area often grouped under mechanical technology and is described in the statement on Drafters. (Also see statements on Mechanical Engineers, and Manufacturers' Salesworkers elsewhere in this book.)

Instrumentation Technology. Automated manufacturing and industrial processes, oceanographic and space exploration, weather forecasting, satellite communication systems, environmental protection, and medical research have helped to make instrumentation technology a fastgrowing field for technicians. They help develop and design complex measuring and control devices such as those in a spacecraft that sense and measure changes in heat or pressure, automatically record data, and make necessary adjustments. These technicians have extensive knowledge of physical sciences as well as electrical-electronic and mechanical engineering.

Several areas of opportunity exist in the physical sciences:

Chemical technicians work with chemists and chemical engineers to develop, sell, and utilize chemical and related products and equipment.

Most chemical technicians do research and development, testing, or other laboratory work. They often set up and conduct tests on processes and products being developed or improved. For example, a technician may examine steel for carbon, phosphorous, and sulfur content or test a lubricating oil by subjecting it to changing temperatures. The technician measures reactions, analyzes the results of experiments, and records data which will be the basis for decisions and future research.

Chemical technicians in production generally put into commercial operation those products or processes developed in research laboratories. They assist in making the final design, installing equipment, and training and supervising operators on the production line. Technicians in quality control test materials, production processes, and final products to insure that they meet the manufacturer's specifications and quality standards. Many also work as technical sales personnel, selling chemicals or chemical products.

Many chemical technicians use computers and instruments, such as a dilatometer (which measures the expansion of a substance). Because the field of chemistry is so broad, chemical technicians frequently specialize in a particular industry such as food processing or pharmaceuticals. (See statements on Chemists and Chemical Engineers, elsewhere in this book.)

Meteorological technicians support meteorologists in the study of atmospheric conditions. Technicians calibrate instruments, observe, record, and report meteorological occurrences, and assist in research projects and the development of scientific instruments.

Geological technicians assist geologists in evaluating earth processes. Currently much research is being conducted in seismology, petroleum and mineral exploration, and ecology. These technicians install seismographic instruments, record measurements from these instruments, assist in field evaluation of earthquake damage and surface displacement, or assist geologists in earthquake prediction research. In petroleum and mineral exploration, they help conduct tests and record sound wave data to determine the likelihood of successful drilling, or use radiation detection instruments and collect core samples to help geologists evaluate the economic possibilities of mining a given resource.

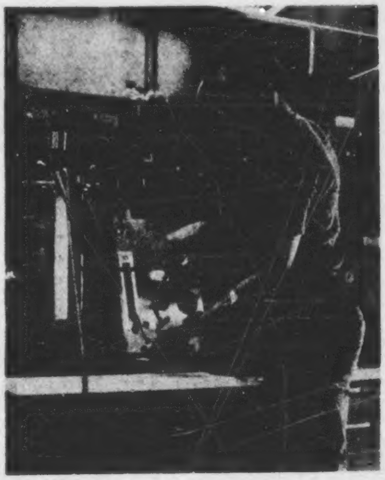
Hydrologic technicians gather data to help professional hydrologists predict river stages and water quality levels. They monitor instruments which measure water flow, water table levels, or water quality, they analyze these data and report their findings to the hydrologist. (See statement on Environmental Scientists elsewhere in this book.)

Technician positions in the life sciences are generally included in two categories: *Agricultural technicians* work with agricultural scientists in the areas of food production and processing. Plant technicians conduct tests and experiments to improve the yield and quality of crops, or to increase resistance to disease, insects, or other hazards. Technicians in soil science analyse the chemical and physical properties of various soils to help determine the best uses for these soils. Animal husbandry technicians concern themselves mainly with the breeding and nutrition of animals. In addition, several thousand technicians work in the food industry as food processing technicians. They work in quality control or in food science research, helping food scientists develop better and more efficient ways of processing food material for human consumption. (See statement on Food Scientists elsewhere in this book.)

Biological technicians work primarily in laboratories where they perform tests and experiments under controlled conditions. Microbiological technicians study microscopic organisms and may be involved in immunology or parasitology research. Laboratory animal technicians study and report on the reaction of laboratory animals to certain physical and chemical stimuli. They also study and conduct research to help biologists develop cures which may be applied to human diseases.

Biochemical technicians assist biochemists in the chemical analysis of biological substances (blood, other body fluids, foods, drugs). Most of their work involves conducting experiments and reporting their results to a biochemist. As a biological technician, one might also work primarily with insects, studying insect control, developing new insecticides, or determining how to use insects to control other insects or undesirable plants. (See statements on Life Scientists elsewhere in this book.)

Technicians also specialize in fields such as metallurgical (metal), electrical, and optical technology. In the atomic energy field, technicians work with scientists and engineers on problems of radiation safety, inspection, and decontamination. New areas of work include environmental protection, where technicians study the problems of air and water pollution, as well as the field of industrial safety.



Agricultural technician extracts grain sample for lab test.

Places of Employment

Over 560,000 persons worked as engineering and science technicians in 1974. Almost 390,000 worked in engineering fields, about 125,000 in the physical science occupations, and about 50,000 in the life sciences. About 13 percent of all engineering and science technicians were women. The proportion of women technicians, by field, was 30 percent in life science; 15 percent in physical science; and 5 percent in engineering.

More than 375,000 (about 2 out of 3) technicians worked in private industry. In the manufacturing sector, the largest employers were the electrical equipment, chemicals, machinery, and aerospace industries. In nonmanufacturing, large numbers worked in wholesale and retail trade, communications, and in engineering and architectural firms.

In 1974, the Federal Government employed about 87,000 technicians, chiefly as engineering aids and technicians, equipment specialists, biological technicians, cartographic technicians (mapmaking), meteorological technicians, and physical science technicians. The largest number worked for the Department of Defense; most of the others worked for the Departments of Transportation, Agriculture, Interior, and Commerce.

State government agencies employed nearly 50,000 engineering and science technicians, and local governments about 11,000. The remainder worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Persons can qualify for technician jobs through many combinations of work experience and education because employers traditionally have been flexible in their hiring standards. However, most employers prefer applicants who have had some specialized technical training. Specialized training is available at technical institutes, junior and community colleges, area vocational-technical schools, extension divisions of colleges and universities, and vocational-technical high schools. Engineering and science students who have not completed the bachelor's degree and others who have degrees in science and mathematics also are able to qualify for technician positions.

Persons can also qualify for technician jobs by less formal methods. Workers may learn through on-the-job training programs or courses in post-secondary or correspondence schools. Some qualify on the basis of experience gained in the Armed Forces. However, post-secondary training is increasingly necessary for advancement to more responsible jobs.

Some of the types of post-secondary and other schools which provide technical training are discussed in the following paragraphs:

Technical Institutes. Technical institutes offer training to qualify students for a job immediately after graduation with a minimum of on-the-job training. In general, students receive intensive technical training but less theory and general education than in engineering schools or liberal arts colleges. A few technical institutes and community colleges offer cooperative programs; students spend part of the time in school and part in paid employment related to their studies.

Some technical institutes operate as regular or extension divisions of colleges and universities. Other institutions are operated by States and municipalities, or by private organizations.

Junior and Community Colleges. Curriculums in junior and community colleges which prepare students for technician occupations are similar to those in the freshman and sophomore years of 4-year colleges. After completing the 2-year program, graduates can transfer to 4-year colleges or qualify for some technician jobs. Most large community colleges offer 2-year technical programs, and many employers prefer graduates having more specialized training.

Area Vocational-Technical Schools. These post-secondary public institutions serve students from surrounding areas and train them for jobs in the local area. Most of these schools require a high school degree or its equivalent for admission.

Other Training. Some large corporations conduct training programs and operate private schools to meet their needs for technically trained personnel in specific jobs; such training rarely includes general studies. Training for some technician occupations, for instance tool designers and electronic technicians, is available through formal 2- to 4-year apprenticeship programs. The apprentice gets on-the-job training under the close supervision of an experienced technician and related technical knowledge in classes, usually after working hours.

The Armed Forces have trained many technicians, especially in electronics. However, military job requirements are generally different from those in the civilian economy. Thus, military technician training may not be adequate for civilian technician work, and additional training may be necessary for employment.

Technician training also is available from many private technical and correspondence schools that often specialize in a single field such as electronics. Some of these schools are owned and operated by large corporations that have the resources to provide very up-to-date training in a technical field.

Those interested in a career as a technician should have an aptitude for mathematics and science, and enjoy technical work. An ability to do detailed work with a high degree of accuracy is necessary; for design work, creative talent also is desirable. Since technicians are part of a scientific team, they sometimes must work under the close supervision of engineers and scientists as well as with other technicians and skilled workers.

Engineering and science technicians usually begin work as trainees in routine positions under the direct supervision of an experienced technician, scientist, or engineer. As they gain experience, they receive more responsibility and carry out a particular assignment under only general supervision. Technicians may eventually move into supervisory positions. Those who have the ability and obtain additional education are sometimes upgraded to professional science or engineering positions.

Employment Outlook

Employment opportunities for engineering and science technicians are expected to be favorable through the mid-1980's. Opportunities will be best for graduates of post-secondary school technician training programs. Besides the openings resulting from faster than average growth expected in this field, additional technicians will be needed to replace those who die, retire, or leave the occupation.

Industrial expansion and the increasing complexity of modern technology underlie the anticipated increase in demand for technicians. Many will be needed to work with the growing number of engineers and scientists in developing, producing, and distributing new and technically advanced products. Automation of industrial processes and growth of new work areas such as environmental protection and urban development will add to the demand for technical personnel.

The anticipated growth of research and development (R&D)

expenditures in industry and government should increase demand for technicians. However, this growth is expected to be slower than in the past.

Because space and defense programs are major factors in the employment of technical personnel, expenditures in these areas affect the demand for technicians. The outlook for technicians is based on the assumption that defense spending will increase from the 1974 level by the mid-1980's, but will still be slightly lower than the levels of the late 1960's. If defense spending should differ substantially from this level, the demand for technicians would be affected accordingly.

Earnings

In general, technicians' earnings depend on their education and technical specialty, as well as their ability and work experience, and the industry in which they work.

In private industry in 1974, average starting salaries for 2-year graduates ranged from about $8,200 to $9,800 a year, while nongraduates earned average starting salaries from just over $6,000 to about $8,500. Starting salaries for bachelor's degree recipients averaged over $10,000 a year. According to a 1974 Bureau of Labor Statistics survey, experienced engineering technicians in private industry earned average salaries of about $13,500 a year.

Starting salaries for all technicians in the Federal Government were fairly uniform in late 1974. A high school graduate with no experience could expect $5,996 annually to start. With an associate degree, the starting salary was $7,596, and if a bachelor's degree were held, the annual salary might be $8,500 or $10,520 (depending on the type of job vacancy and the applicant's education and other qualifications). At higher experience levels, however, differences in earnings are significant. The average annual salary for all engineering technicians employed by the Federal Government in late 1974 was $16,000; for physical science technicians, $15,000; and for life science technicians, about $11,000.

Sources of Additional Information

For information on careers for engineering and science technicians and engineering and technology programs, contact:

Engineers Council for Professional Development, 345 East 47th St., New York, N.Y. 10017.

Information on schools offering technician programs is available from:

National Association of Trade and Technical Schools, Accrediting Commission, 2021 L St. NW., Washington, D.C. 20036.

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

State departments of education also have information about approved technical institutes, junior colleges, and other educational institutions within the State offering post-high school training for specific technical occupations. Other sources include:

American Association of Community and Junior Colleges, Suite 410, 1 Dupont Circle, Washington, D.C. 20036.

National Home Study Council, 1601 18th St. NW., Washington, D.C. 20009.

SURVEYORS

(D.O.T. 018.188)

Nature of the Work

Before engineers can plan highways or other construction projects, they need complete and accurate information about boundaries, land features, and other physical characteristics of the construction site. Surveyors measure construction sites, help establish official land boundaries, assist in setting land valuations, and collect information for maps and charts.

Surveyors often work as party chiefs; that is, they are in charge of a field party that determines the precise measurements and locations of elevations, points, lines, and contours on the earth's surface, and distances between points. Surveyors are directly responsible for the field party's activity and the accuracy of its work. They plan the field work, select survey reference points, and determine the precise location of natural and man-made features of the survey region. They record the information disclosed by the survey, verify the accuracy of the survey data, and prepare sketches, maps, and reports.

A typical field party is made up of the party chief and three to six assistants and helpers. *Instrument workers* (D.O.T. 018.188) adjust and operate surveying instruments such as the theodolite (used to measure altitude). *Chain workers* (D.O.T. 018.687) use a steel tape or surveyor's chain to measure distances between surveying points. Generally chain workers operate in pairs, one holding the tape at the last established point, and the other marking an advanced measuring point. Chain workers also may mark measured points with painted stakes. *Rod workers* (D.O.T. 018.587) use a level rod, range pole, or other equipment to assist instrument workers in determining elevations, distances, and directions. They hold and move the range pole according to hand or verbal signals of the instrument worker to help establish the exact point of measurement. Rod workers also may clear brush from the survey line.

Surveyors often specialize in a particular type of survey. Besides doing *highway surveys*, many perform *land surveys* and locate boundaries of a particular tract of land. They then prepare maps and legal descriptions for deeds, leases, and other documents. Surveyors doing *topographic surveys* determine elevations, depressions, and contours of an area, and indicate the location of distinguishing surface features such as farms, buildings, forests, roads, and rivers.

Several closely related occupations are geodesy and photogrammetry. Geodesists measure immense areas of land, sea, or space by taking into account the earth's curvature and its geophysical characteristics. (See statement on Geophysicists elsewhere in this book.) Photogrammetrists measure and interpret natural or man-made features of an area. They make topographic and thematic maps by applying analytical processes and mathematical techniques to photographs obtained from aerial, space, and ground surveys. Control surveys on the ground are made to determine the accuracy of maps derived from photogrammatic techniques.

Surveyor checks topography at construction site.

Places of Employment

About 55,000 people worked as surveyors in 1974; less than 5 percent were women. Federal, State, and local government agencies employ about one-third of all surveyors. Among the Federal Government agencies employing these workers are the U.S. Geological Survey, the Bureau of Land Management, the Army Corps of Engineers, and the Forest Service. Most surveyors in State and local government agencies work for highway departments and urban planning and redevelopment agencies.

A large number of surveyors work for construction companies and for engineering and architectural consulting firms. A sizable number either work for or own firms that conduct surveys for a fee. Significant numbers of surveyors also work for crude petroleum and natural gas companies, and for public utilities.

Training, Other Qualifications, and Advancement

A combination of post-secondary school courses in surveying and extensive on-the-job training is the most common method of entering surveying work. Junior colleges, technical institutes, and vocational schools offer 1-, 2-, and 3-year programs in surveying. A few 4-year colleges offer bachelor's degrees specifically in surveying, while many offer several courses in the field. Most surveying programs admit only high school graduates, preferably those who have studied algebra, geometry, trigonometry, calculus, drafting, and mechanical drawing. With some post-secondary school courses in surveying, beginners can generally start as instrument workers. After gaining experience, they usually advance to party chief, and may later seek to become a registered surveyor. In many instances, promotions to higher level positions are based on written examinations as well as experience.

High school graduates with no formal training in surveying usually start as rod workers. After several years of on-the-job experience and some formal training in surveying, it is possible to advance to chain worker, instrument worker, and finally to party chief.

For those interested in a professional career in photogrammetry, a bachelor's degree in engineering or the physical sciences is usually needed.

All 50 States require licensing or registration of land surveyors responsible for locating and describing land boundaries. Registration requirements are generally quite strict, because once registered, surveyors can be held legally responsible for their work. In some States, applicants for licenses need to know other types of surveying in addition to land surveying. Requirements vary among the States but in general they include a combination of 4 to 8 years' experience in surveying and passing an examination. Most States reduce the experience needed to take the licensing examination if the applicant has taken post-secondary courses in surveying.

In 1974, about 20,000 land surveyors were registered. In addition, about 13,000 engineers were registered to do land surveying, primarily as part of their civil engineering duties; however, these workers are considered engineers rather than surveyors. (See statement on Civil Engineers elsewhere in this book.)

Qualifications for success as a surveyor include ability to visualize objects, distances, sizes, and other abstract forms and to make mathematical calculations quickly and accurately. Leadership qualities also are important as surveyors must supervise the work of others.

Members of a survey party must be strong and healthy in order to work outdoors and carry equipment over difficult terrain. They also need good eyesight, coordination, and hearing in order to communicate over great distances by hand signals or voice calls.

Employment Outlook

Employment opportunities for surveyors are expected to be favorable through the mid-1980's, especially for those with postsecondary school training. Employment of surveyors is expected to grow much faster than the average for all occupations through the mid-1980's. In addition to the openings resulting from growth, many will result from the need to replace those who die, retire, or transfer to other fields of work.

The rapid development of urban areas and increased land values should create jobs for surveyors to locate boundaries for property records. Others will be needed to lay out streets, shopping centers, schools, and recreation areas. Construction and improvement of the Nation's roads and highways also will require many new surveyors.

Earnings and Working Conditions

In the Federal Government in late 1974, high school graduates with little or no training or experience started as rod workers or chain workers with an annual salary of $5,996. Those with 1 year of related post-secondary training earned $6,764. Those with an associate degree which included courses in surveying generally started as instrument workers with an annual salary of $7,596. The majority of surveyors who worked as party chiefs in the Federal Government earned between $9,500 and $13,000 per year and some surveyors in high-level positions earned more than $15,000 per year.

Although salaries in private industry vary by geographic area, limited data indicate that salaries are generally comparable to those in Federal service and are above the average earnings of nonsupervisory workers in private industry, except farming.

Surveyors usually work an 8-hour, 5-day week. However, they sometimes work longer hours during the summer months when weather conditions are most suitable for surveying. The work of surveyors is active and sometimes strenuous. They often stand for long periods and walk long distances or climb mountains with heavy packs of instruments and equipment. Because most work is out-of-doors, surveyors are exposed to all types of weather. Some duties, such as planning surveys, preparing reports and computations, and drawing maps, usually are done in an office.

Sources of Additional Information

Information about training and career opportunities in surveying is available from:

American Congress on Surveying and Mapping, Woodward Building, 733 15th St. NW., Washington, D.C. 20005.

General information on careers in photogrammetry is available from:

American Society of Photogrammetry, 150 North Virginia Ave., Falls Church, Va. 22046.

HEALTH OCCUPATIONS

When people are sick or injured, having health services readily available becomes very important to them. The availability of these services depends, not only on the number of people employed in health occupations, but also on their geographic distribution. Numbers employed have grown very rapidly in recent years. How to improve their distribution remains a problem which is being attacked on the national, State, and local levels.

About 3.9 million people worked in health-related occupations in 1974. Besides doctors, nurses, dentists, and therapists, these include the behind-the-scenes technologists, technicians, administrators, and assistants.

Registered nurses, physicians, pharmacists, and dentists constitute the largest professional health occupations. In 1974 employment in these occupations ranged from 105,000 for dentists to 855,000 for registered nurses. Professional health occupations also include other medical practitioners—osteopathic physicians, chiropractors, optometrists, podiatrists, and veterinarians. Therapists (physical therapists, occupational therapists, and speech pathologists and audiologists) and administrators (health services administrators and medical record administrators) also are professional health workers, as are dietitians.

Other health service workers include technicians of various types, such as medical technologist, dental hygienist, and respiratory therapist.

Hospitals employ about half of all workers in the health field. Others work in clinics, laboratories, pharmacies, nursing homes, public health agencies, mental health centers, private offices, and patients' homes. Health workers are concentrated in the more heavily populated and prosperous areas of the Nation.

Training

The educational and other requirements for work in the health field are as diverse as the health occupations themselves. For example, professional health workers—physicians, dentists, pharmacists, and others —must complete a number of years of preprofessional and professional college education and pass a State licensing examination. On the other hand, some health service occupations can be entered with little specialized training. Many community and junior colleges offer courses to prepare students for various health occupations. In most of the occupations for which on-the-job training has been the usual means of preparation, employers now prefer persons who have completed one of these formal programs.

Earnings

People in health occupations that require graduation from college earn from one-and-a-quarter times to twice these average earnings. Among the occupations for which average yearly earnings are reported in this book, the top 15 include 8 of the professional health occupations, including all 6 medical practitioners.

Outlook

Overall employment in the health field is expected to grow much faster than the average for all occupations through the mid-1980's, although the rates of growth will differ considerably among individual health occupations. Among the factors that are expected to contribute to an increase in the demand for health care are population growth and the public's increasing health consciousness. Expansion of coverage under prepayment programs that make it easier for persons to pay for hospitalization and medical care also will contribute to growth in this field. Other openings will be created each year by the increasing expenditures by Federal, State, and local governments for health care and services.

In addition to jobs created by employment growth, many new workers will be needed each year to replace those who retire, die, or leave the field for other reasons.

Recent expansion of training programs in most of the occupations will add to the supply of trained health service personnel. The employment outlook in the various occupations ranges from excellent to competitive, depending on the balance between supply of workers and expected openings. See the individual statements for the outlook for each occupation.

MEDICAL AND DENTAL PRACTITIONERS

CHIROPRACTORS

(D.O.T. 079.108)

Nature of the Work

Chiropractic is a system of treatment based on the principle that a person's health is determined largely by the nervous system, and that interference with this system impairs normal functions and lowers resistance to disease. Chiropractors treat patients primarily by manual manipulation of parts of the body, especially the spinal column.

Because of the emphasis on the spine and its position, most chiropractors use X-rays extensively to aid in locating the source of patients' difficulties. In addition to manipulation, some chiropractors use such supplementary measures as water, light, and heat therapy, and prescribe diet, exercise, and rest. Most State laws restrict the type of supplementary treatment permitted in chiropractic. Chiropractic as a system for healing does not include the use of drugs or surgery.

Places of Employment

About 18,000 persons, 6 percent of them women, practiced chiropractic in 1974. Most chiropractors are in private practice. Some are salaried assistants of established practitioners or work for chiropractic clinics and industrial firms. Others teach or conduct research at chiropractic colleges. More than two-fifths of all chiropractors are located in California, Michigan, Missouri, New York, Pennsylvania, and Texas.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet certain educational requirements and pass a State board examination. Although the type of practice permitted and the educational requirements for a license vary considerably from one State to another, most States require successful completion of a 4-year chiropractic course following 2 years of preprofessional college work. In addition, several States require that chiropractors pass a basic science examination. Chiropractors licensed in one State may obtain a license in most other States by reciprocity.

In 1974, there were 12 chiropractic colleges. All require 2 years of college before entrance, and some require that specific courses be taken during these 2 years. Most chiropractic colleges emphasize courses in manipulation and spinal adjustments. Others offer a broader curriculum, including subjects such as physiotherapy and nutrition. In most chiropractic colleges, the first 2 years of the curriculum are devoted chiefly to classroom and laboratory work in subjects such as anatomy, physiology, and biochemistry. During the last 2 years, students obtain practical experience in college clinics. The degree of Doctor of Chiropractic (D.C.) is awarded to students completing 4 years of chiropractic training.

Chiropractic requires considerable hand dexterity but not unusual strength or endurance. Persons desiring to become chiropractors should be able to work independently and handle responsibility. The ability to work with detail is important. Sympathy and understanding are among personal qualities considered desirable in dealing effectively with patients.

Most newly licensed chiropractors either set up a new practice or purchase an established one. Some start as salaried chiropractors to acquire experience and funds needed to establish their own practice. A moderate financial investment is usually necessary to open and equip an office.

Employment Outlook

The number of chiropractors is expected to increase faster than the average for all occupations to the mid-1980's as public acceptance of chiropractic healing continues to grow. In addition to openings that will result from increasing demand, an even greater number of chiropractors will be needed to replace those who die, retire, or leave the occupation for other reasons.

The supply of chiropractors, however, also has begun to expand rapidly. Enrollments in chiropractic colleges are growing dramatically, in apparent response to the broader public acceptance of the profession. As more students graduate and the number of active practitioners swells, new chiropractors may find it increasingly difficult to establish a practice in those areas where other practitioners already are located. The best opportunities for new chiropractors may be in areas with comparatively few established practitioners.

Earnings and Working Conditions

In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning, but rise after the first few years. Incomes of chiropractors vary widely. Earnings for beginning chiropractors were between $12,000 and $15,000 a year in 1974. Experienced chiropractors earned an average of about $28,000, according to limited data available, although many earn considerably more.

Sources of Additional Information

The State board of licensing in the capital of each State can supply information on State licensing requirements.

General information on chiropractic as a career and a list of schools of chiropractic are available from:

American Chiropractic Association, 2200 Grand Ave., Des Moines, Iowa 50312.

International Chiropractors Association, 741 Brady St., Davenport, Iowa 52808.

For information on requirements for admission to a specific chiropractic college, contact the admissions office of that school.

DENTISTS

(D.O.T. 072.108)

Nature of the Work

Dentists examine teeth and other tissues of the mouth to diagnose diseases or abnormalities. They take X-rays, fill cavities, straighten teeth, and treat gum diseases. Dentists extract teeth and substitute artificial dentures designed for the individual patient. They also perform corrective surgery of the gums and supporting bones. In addition, they may clean teeth.

Dentists spend most of their time with patients, but may devote some time to laboratory work such as making dentures and inlays. Most dentists, however—particularly in large cities—send their laboratory work to commercial firms. Some dentists also employ dental hygienists to clean patients' teeth and provide instruction for patient self-care. They also may employ other assistants who perform office work, assist in "chairside" duties, and provide therapeutic services under the supervision of the dentist.

Most dentists are general practitioners who provide many types of dental care; about 10 percent are specialists. The largest group of specialists are orthodontists, who straighten teeth. The next largest group, oral surgeons, operate on the mouth and jaws. The remainder specialize in pedodontics (dentistry for children); periodontics (treating the gums); prosthodontics (making artificial teeth or dentures); endodontics (root canal therapy); public health dentistry; and oral pathology (diseases of the mouth).

About 4 percent of all dentists teach in dental schools, do research, or administer dental health programs on a full-time basis. Many dentists in private practice do this work on a part-time basis.

Places of Employment

Over 105,000 dentists were at work in the United States in 1974—9 of every 10 were in private practice. About 6,500 served as commissioned officers in the Armed Forces, and about 1,100 had other types of Federal Government positions—chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service. Women dentists represent only about 2 percent of the profession, but their number is increasing.

Training, Other Qualifications, and Advancement

A license to practice dentistry is

required in all States and the District of Columbia. To qualify for a license, a candidate must be a graduate of an approved dental school and pass a State board examination. In 1974, 49 States and the District of Columbia recognized the examination given by the National Board of Dental Examiners as a substitute for the written part of the State board examinations. Delaware also requires new graduates to serve 1 year of hospital internship, in addition to passing the written examination. Most State licenses permit dentists to engage in both general and specialized practice. In 13 States, however, a dentist cannot be licensed as a "specialist" without 2 or 3 years of graduate education and passing a special State examination. Few States permit dentists licensed in other States to practice in their jurisdictions without further examination.

Dental colleges require from 2 to 4 years of predental education. However, of those students entering dental school in 1974, 76 percent had a baccalaureate or master's degree. Predental education must include courses in the sciences and humanities.

Competition is keen for admission to dental schools. In selecting students, schools give considerable weight to college grades and amount of college education. In addition, all dental schools participate in a nationwide admission testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many State-supported dental schools also give preference to residents of their particular States.

Dental school training generally lasts 4 academic years although some institutions condense this into 3 calendar years. Studies begin with an emphasis on classroom instruction and laboratory work in basic sciences such as anatomy, microbiology, biochemistry, and physiology. Courses in clinical sciences and preclinical technique also are provided at this time. The last 2 years are spent chiefly in a dental clinic, treating patients.

The degree of Doctor of Dental Surgery (D.D.S.) is awarded by most dental colleges. An equivalent degree, Doctor of Dental Medicine (D.M.D.). is conferred by 18 schools.

Dentists who want to do research, teach, or become specialists must spend an additional 2 to 4 years in advanced dental training in programs operated by dental schools, hospitals, and other institutions of higher education.

Dental education is very costly because of the time required to earn the dental degree. However, Federal funds provide a limited number of loans for dental students, and scholarships are available for qualifying students who agree to a minimum of 2 years' Federal service.

The profession of dentistry requires both manual skills and a high level of intelligence. Dentists should have good visual memory, excellent judgment of space and shape, delicacy of touch, and a high degree of manual dexterity, as well as scientific ability. Good business sense, self-discipline, and the ability to instill confidence are helpful for success in private practice. High school students who want to become dentists are advised to take courses in biology, chemistry, health, and mathematics.

Most dental graduates open their own offices or purchase established practices. Some start in practice with established dentists, to gain experience and to save the money required to equip an office; others may enter residency or internship training programs in approved hospitals. Dentists who enter the Armed Forces are commissioned as captains in the Army and Air Force and as lieutenants in the Navy. Graduates of recognized dental schools are eligible for Federal Civil Service positions and for commissions (equivalent to lieutenants in the Navy) in the U.S. Public Health Service.

Employment Outlook

Employment opportunities for dentists are expected to be excellent through the mid-1980's. Dental school enrollments have grown in recent years because of federally assisted construction of additional training facilities. However, unless schools expand beyond present levels, the number of new entrants to the field is expected to fall short of the number needed to fill openings created by growth of the occupation and by those who die or retire from the profession.

Employment of dentists is expected to grow faster than the average for all occupations due to population growth, increased awareness that regular dental care helps prevent and control dental diseases, and the expansion of prepayment arrangements which make it easier for people to afford dental services. In addition, dental public health programs will need qualified administrators and dental colleges will need additional faculty members. Many dentists will continue to serve in the Armed Forces.

Fluoridation of community water supplies and improved dental hygiene may prevent some tooth and gum disorders, and preserve teeth that might otherwise be extracted. However, since the preserved teeth will need care in the future, these measures may increase rather than decrease the demand for dental care. New techniques, equipment, and drugs, as well as the expanded use of dental hygienists, assistants, and laboratory technicians should enable individual dentists to care for more patients. However, these developments are not expected to offset the need for more dentists.

Earnings and Working Conditions

During the first year or two of practice, dentists often earn little more than the minimum needed to cover expenses, but their earnings usually rise rapidly as their practice develops. Specialists generally earn considerably more than general practitioners. The average income of dentists in 1974 was about $38,000 a year, according to the limited information available. In the Federal Government, new graduates of dental schools could expect to start at $15,481 a year in late 1974.

Location is one of the major factors affecting the income of dentists who open their own offices. For example, in high-income urban areas, dental services are in great demand; however, a practice can be developed most quickly in small towns, where new dentists easily become known and where they may face less competition from established practitioners. Although the income from practice in small towns may rise rapidly at first, over the long run the level of earnings, like the cost of living, may be lower than it is in larger communities.

Most dental offices are open 5 days a week and some dentists have evening hours. Dentists usually work between 40 and 45 hours a week, although many spend more than 50 hours a week in the office. Dentists often work fewer hours as they grow older, and a considerable number continue in part-time practice well beyond the usual retirement age.

Sources of Additional Information

Persons who wish to practice in a given State should obtain the requirements for licensure from the board of dental examiners of that State. Lists of State boards and of accredited dental schools, as well as information on dentistry as a career, is available from:

American Dental Association, Council on Dental Education, 211 East Chicago Ave., Chicago, Ill. 60611.

American Association of Dental Schools, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

Students should contact the director of student financial aid at the school they attend to get information about Federal loans and scholarships.

OPTOMETRISTS

(D.O.T. 079.108)

Nature of the Work

About 1 out of every 2 persons in the United States needs eye care. Optometrists provide most of this care. They examine people's eyes for vision problems, disease, and other abnormal conditions, and test for proper depth and color perception and the ability to focus and coordinate the eyes. When necessary, they prescribe lenses and treatment. Where evidence of disease is present, the optometrist refers the patient to the appropriate medical practitioner. Most optometrists supply the prescribed eyeglasses and fit and adjust contact lenses. Optometrists also prescribe corrective eye exercises or other treatment not requiring drugs or surgery.

Although most optometrists are in general practice, some specialize in work with the aged or with children. Others work only with persons having partial sight who can be helped with microscopic or telescopic lenses. Still others are concerned with the visual safety of industrial workers. A few optometrists teach or do research.

Optometrists should not be confused with either ophthalmologists, sometimes referred to as oculists, or with dispensing opticians. Ophthalmologists are physicians who specialize in medical eye care, eye diseases and injuries, perform eye surgery, and prescribe drugs or other eye treatment, as well as lenses. Dispensing opticians fit and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists; they do not examine eyes or prescribe treatment. (See statement on Dispensing Opticians.)

Places of Employment

In 1974, there were about 19,000 practicing optometrists. Although women currently make up only 3 percent of the profession, the proportion of women enrolled in optometry schools has been increasing in recent years.

Most optometrists are in solo practice. Others are in partnerships or group practice with other optometrists or doctors as part of a professional health care team.

Some optometrists work in specialized hospitals and eye clinics or teach in schools of optometry. Others work for the Veterans Administration, public and private health agencies, and industrial health insurance companies. About 500 optometrists serve as commissioned officers in the Armed Forces. Optometrists also may act as consultants to engineers specializing in safety or lighting, educators in remedial reading, or serve as members of health advisory committees to Federal, State, and local governments.

According to a recent survey, about 2 optometrists out of 5 practice in towns of under 25,000 inhabitants.

Training, Other Qualifications, and Advancement

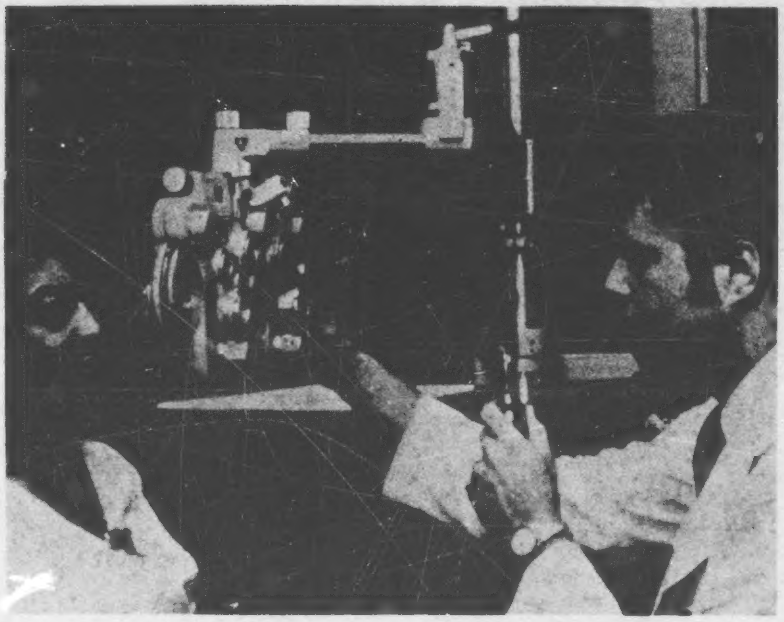
All States and the District of Columbia require that optometrists be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited optometric school and pass a State board examination. In some States, applicants are permitted to substitute the National Board of Optometry examination, given in the third and fourth year of optometric school, for part or all of the written State examination. Several States allow applicants to be licensed without lengthy examination if they have a license in another State.

The Doctor of Optometry degree requires a minimum of 6 years of college consisting of a 4-year professional degree program preceded by at least 2 years of preoptometric study at an accredited university, college, or junior college. In 1974, there were 12 schools and colleges of optometry approved by the Council on Optometric Education of the American Optometric Association. Requirements for admission to these schools usually include courses in English, mathematics, physics, chemistry, and biology, or zoology. Some schools also require courses in psychology, social studies, literature, philosophy, and foreign languages.

Since most optometrists are self-employed, business ability, self-discipline, and the ability to deal with patients tactfully are necessary for success.

Many beginning optometrists enter into associate practice with an optometrist or other health professional. Others either purchase an established practice or set up a new practice. Some take salaried positions to obtain experience and the necessary funds to enter their own practice.

Optometrists wishing to advance in a specialized field may study for a Master's or Doctor of Philosophy degree in physiological optics, neurophysiology, public health administration, health information and communication, or health education. Optometrists who enter the Armed Forces as career officers have the opportunity to work toward advanced degrees and to do vision research. requirements.



Employment Outlook

Employment opportunities for optometrists are expected to be favorable through the mid-1980's. The number of new graduates from schools of optometry is expected to be adequate to fill the positions made available by employment growth and the need to replace optometrists who die and retire.

Employment of optometrists is expected to grow about as fast as the average for all occupations. An increase in the total population, especially in the groups most likely to need glasses—older people and white-collar workers—is the main factor contributing to the expected growth in the occupation. Greater recognition of the importance of good vision for efficiency at school and work, and the possibility that more persons will have health insurance to cover optometric services, also should increase the demand for optometric services.

Earnings and Working Conditions

In 1974, net earnings of new optometry graduates averaged about $13,500, while experienced optometrists averaged about $30,000 annually. Optometrists working for the Federal Government earned an average of $17,500 a year in late 1974. Incomes vary greatly, depending upon location, specialization, and other factors. Optometrists entering solo practice begin at approximately the same income level as those entering associateship or group practice. However, after several years, optometrists in associateship or partnership practice may earn substantially more than their solo practitioner counterparts.

Independent practitioners can set their own work schedule. Some work over 40 hours a week, including Saturday. Since the work is not physically strenuous, optometrists often can continue to practice after the normal retirement age.

Sources of Additional Information

Information on optometry as a career and a list of scholarships and loan funds offered by various State associations, societies, and institutions are available from:

American Optometric Association, 7000 Chippewa St., St. Louis, Mo. 63119.

Federal Health Professions Loans are available for optometric students who meet certain financial needs requirements. For information on this financial aid and on required preoptometry courses, contact individual optometry schools. The Board of Optometry in the capital of each State can supply a list of optometry schools approved by that State, as well as licensing requirements.

OSTEOPATHIC PHYSICIANS

(D.O.T. 071.108)

Nature of the Work

Osteopathic physicians diagnose and treat diseases or maladies of the human body. They are particularly concerned about problems involving the muscles or bones. One of the basic treatments or therapies used by osteopathic physicians centers on manipulating these systems with the hands. Osteopathic physicians also use surgery, drugs, and all other accepted methods of medical care.

Most osteopathic physicians are "family doctors" who engage in general practice. These physicians usually see patients in their offices, make house calls, and treat patients in osteopathic and some city and county hospitals. Some doctors of osteopathy teach, do research, or write and edit scientific books and journals.

In recent years, specialization has increased. In 1974, about 25 percent were practicing specialties including internal medicine, neurology and psychiatry, ophthalmology, pediatrics, anesthesiology, physical medicine and rehabilitation, dermatology, obstetrics and gynecology, pathology, proctology, radiology, and surgery.

Places of Employment

About 14,500 osteopathic physicians were practicing in the United States in 1974; nearly 9 percent were women. Nearly all osteopathic physicians were in private practice. Less than 5 percent had full-time salaried positions in osteopathic hospitals and colleges, private industry, or government agencies.

Osteopathic physicians are located chiefly in those States that have osteopathic hospital facilities. In 1974, almost half of all osteopathic physicians were in Michigan, Pennsylvania, New Jersey, Ohio, and Missouri. Twenty-three States and the District of Columbia each had fewer than 50 osteopathic physicians. More than half of all general practitioners are located in towns and cities having fewer than 50,000 people; specialists, however, practice mainly in large cities.

Training and Other Qualifications

A license to practice as an osteopathic physician is required in all States. To obtain a license, a candidate must be a graduate of an approved school of osteopathy and pass a State board examination. In 13 States and the District of Columbia, candidates must pass an examination in the basic sciences before they are eligible to take the professional examination; 35 States and the District of Columbia also require a period of internship in an approved hospital after graduation from an osteopathic school. The National Board of Osteopathic Examiners also gives an examination which is accepted by some States as a substitute for state examination. All States except Alaska and California grant licenses without further examination to properly qualified osteopathic physicians already licensed by another State.

Although 3 years of preosteopathic college work is the minimum entrance requirement for schools of osteopathy, almost all osteopathic students have a bachelor's degree. Preosteopathic education must include courses in chemistry, physics, biology, and English. Osteopathic colleges require successful completion of 3 to 4 years of professional study for the degree of Doctor of Osteopathy (D.O.). During the first half of professional training, emphasis is placed on basic sciences such as anatomy, physiology, pathology, and on the principles of osteopathy; the remainder of the study is devoted largely to work with patients in hospitals and clinics.

After graduation, nearly all doctors of osteopathic medicine serve a 12-month internship at 1 of the 73 osteopathic hospitals that the American Osteopathic Association has approved for intern training. Those who wish to become specialists must have 2 to 5 years of additional training, followed by 2 years of supervised practice in the specialty.

The osteopathic physician's training is very costly because of the length of time it takes to earn the D.O. degree. However, Federal funds provide a limited number of loans for students of osteopathy, and scholarships are available to those who qualify and agree to a minimum of 2 years' Federal service.

The seven schools of osteopathy admit students on the basis of grades received in college, scores on the required Medical College Admissions Test, and the amount of preosteopathic college work completed. The applicant's desire to serve as an osteopathic physician rather than as a doctor trained in other fields of medicine is a very important qualification. The colleges also give considerable weight to a favorable recommendation by an osteopathic physician familiar with the applicant's background.

Newly qualified doctors of osteopathic medicine usually establish their own practice, although a growing number are entering group practice. A few work as assistants to experienced physicians or become associated with osteopathic hospitals. In view of the variation in State laws, persons who wish to become osteopathic physicians should study carefully the professional and legal requirements of the State in which they plan to practice. The availability of osteopathic hospitals and clinical facilities also should be considered.

Persons who wish to become osteopathic physicians must have a strong desire to practice osteopathic principles of healing. They must be willing to study a great deal throughout their career to keep up with the latest advances in osteopathic medicine. They should have a keen sense of touch, emotional stability, and self-confidence. A pleasant personality, friendliness, patience, and the ability to deal with people also are important.

Employment Outlook

Opportunities for osteopathic physicians are expected to be very good through 1980. With the planned expansion of schools of osteopathic medicine, by 1985 the number of osteopathic physicians available is expected to be in rough balance with the openings created by growth in the occupation and by those who die or retire from the profession. Greatest demand probably will continue to be in States where osteopathic medicine is a widely accepted method of treatment, such as Pennsylvania and a number of Midwestern States. Generally, prospects for beginning a successful practice are likely to be best in rural areas, small towns, and city suburbs, where young doctors of osteopathy may establish their professional reputations more easily than in the centers of large cities.

The osteopathic profession is expected to grow faster than the average for all occupations through the mid-1980's because of the extension of prepayment programs for hospitalization and medical care including Medicare and Medicaid, population growth, and the establishment of additional osteopathic hospital facilities.

Earnings and Working Conditions

In osteopathic medicine, as in many of the other health professions, incomes usually rise markedly after the first few years of practice. Earnings of individual practitioners are determined mainly by ability, experience, geographic location, and the income level of the community served. In 1974, the average income of general practitioners after business expenses was about $31,000, according to the limited data available. This income is very high in comparison with other professions. Specialists usually had higher incomes than general practitioners.

Many osteopathic physicians work more than 50 or 60 hours a week. Those in general practice work longer and more irregular hours than specialists.

Sources of Additional Information

People who wish to practice in a given State should find out about the requirements for licensure directly from the board of examiners of that State. Information on Federal scholarships and loans is available from the Director of Student Financial Aid at the individual schools of osteopathy. For a list of State boards, as well as general information on osteopathy as a career, contact:

American Osteopathic Association, Office of Osteopathic Education, 212 East Ohio St., Chicago, Ill. 60611.

American Association of Colleges of Osteopathic Medicine, 4720 Montgomery Lane, Washington, D.C. 20014.

PHYSICIANS

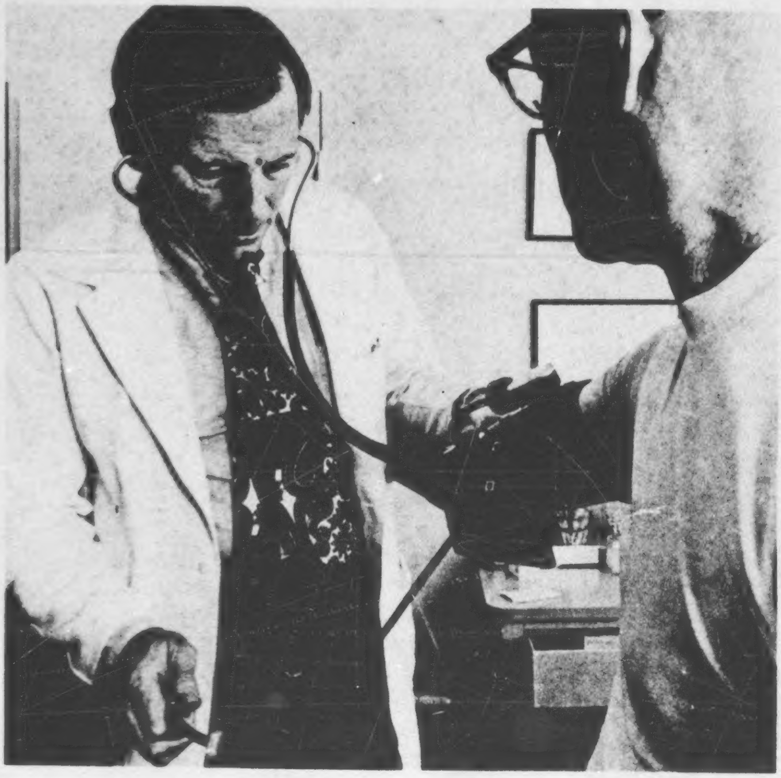
(D.O.T. 070.101 and .108)

Nature of the Work

People in the United States visit a physician on the average of about 5 times a year either for treatment of an illness or injury or else for a routine checkup. Physicians diagnose diseases and treat people who are suffering from injury or disease. They also try to prevent illness by advising patients on self-care related to diet and exercise. Physicians generally examine and treat patients in their own offices and in hospitals, but they also may visit patients at home.

A decreasing percentage of the physicians who provide patient care (about one-fifth in 1974) are general practitioners; the others specialize in one of the 52 fields for which there is graduate training. The largest specialties are internal medicine, general surgery, obstetrics and gynecology, psychiatry, pediatrics, radiology, anesthesiology, ophthalmology, pathology, and orthopedic surgery.

Some physicians combine the practice of medicine with research



or teaching in medical schools. Others hold full-time research or teaching positions or perform administrative work in hospitals, professional associations, and other organizations. A few are primarily engaged in writing and editing medical books and magazines.

Places of Employment

About 335,000 physicians were professionally active in the United States in 1974; about 7 percent of them were women. The recent increase in female enrollment in medical schools points to a larger number of women doctors in the future.

About 9 out of 10 physicians provided patient care services. Nearly 200,000 of these had office practices; more than 91,000 others worked as residents or full-time staff in hospitals. The remaining physicians—about 29,000—taught or performed administrative or research duties.

In 1975, 19,000 graduates of foreign medical schools served as hospital residents in this country. To be appointed to approved residencies in U.S. hospitals, these graduates, except in special instances, must obtain a certificate after passing an examination given by the Educational Commission for Foreign Medical Graduates.

The Northeastern States have the highest ratio of physicians to population and the Southern States the lowest. General practitioners are much more widely spread geographically than specialists, who tend to be concentrated in large cities.

Training and Other Qualifications

All States and the District of Columbia require a license to practice medicine. To qualify for a license, a candidate must be a graduate of an approved medical school, pass a licensing examination, and in 34 States and the District of Columbia serve a 1-year hospital residency. Eleven States require candidates to pass a special examination in the basic sciences to become eligible for the licensing examination.

Licensing examinations are given by State boards. The National Board of Medical Examiners also gives an examination which is accepted by 48 States and the District of Columbia as a substitute for State examinations. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit this reciprocity.

In 1974, there were 114 approved schools in the United States in which students could begin the study of medicine. Of these, 103 awarded the degree of Doctor of Medicine (M.D.); one school offered a 2-year program in the basic medical sciences to students who could then transfer to regular medical schools for the last semesters of study.

Most medical schools require applicants to have completed at least 3 years of college education; some require 4 years. A few medical schools allow selected students who have exceptional qualifications to begin their professional study after 2 years of college. Most students who enter medical schools have a bachelor's degree.

Courses necessary for premedical study include undergraduate work in English, physics, biology, and inorganic and organic chemistry. Students should take courses in the humanities, mathematics, and the social sciences to acquire a broad general education. Other factors considered by medical schools in admitting students include their college records and their scores on the Medical College Admission Test, which is taken by almost all applicants. Consideration also is given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities in college. Many State-supported medical schools give preference to residents of their particular States and sometimes, those of nearby States.

The traditional 4-year course of study leading to the M.D. degree is offered by 50 medical schools. In the remaining schools, students with demonstrated ability may be allowed to pursue a shortened curriculum. Most of these last 3 years, but a few schools offer the M.D. degree within 6 years of high school graduation.

The first semesters of medical school training are spent primarily in laboratories and classrooms, learning basic medical sciences such as anatomy, biochemistry, physiology, pharamacology, microbiology, and pathology. During the last semesters, students spend most of their time in hospitals and clinics under the supervision of experienced physicians. They learn to take case histories, perform examinations, and recognize diseases.

Many new physicians acquire training beyond the 1-year hospital residency. Those who plan to be general practitioners often spend an additional year or two as hospital residents. To become certified specialists, physicians must pass specialty board examinations. To qualify for these examinations, they must spend from 2 to 4 years—depending on the specialty—in advanced hospital training as residents, followed by 2 years or more of practice in the specialty. Some doctors who want to teach or do research take graduate work leading to the master's or Ph. D. degree in a field such as biochemistry or microbiology.

Medical training is very costly because of the long time required to earn the medical degree. However, many private scholarships and loans are available for medical education. In addition, Federal funds provide scholarships and loans for students a limited number of loans for students, and scholarships are available to those who qualify and agree to a minimum of 2 years' Federal service.

Persons who wish to become physicians must have a strong desire to serve the sick and injured. They must be willing to study a great deal to keep up with the latest advances in medical science. Sincerity and a pleasant personality are assets that help physicians gain the confidence of patients. Prospective physicians should be emotionally stable and able to make decisions in emergencies.

The majority of newly qualified physicians open their own offices or join associate or group practices. Those who have completed 1 year of graduate medical education (a 1-year residency) and enter active military duty initially serve as captains in the Army or Air Force or as lieutenants in the Navy. Graduates of medical schools are eligible for commissions as senior assistant surgeons (equivalent to lieutenants in the Navy) in the U.S. Public Health Service, as well as for Federal Civil Service professional medical positions.

Employment Outlook

The employment outlook for physicians is expected to be very good through the mid-1980's. However, anticipated increases in the numbers of graduates of existing and developing U.S. medical schools, combined with foreign medical graduate entrants point to a greatly improved supply situation. This may result in an increasing movement of physicians into rural and other areas which have experienced shortage conditions in the past. Also, some specialties will have sufficient numbers of practitioners by 1980 or 1985 so that new graduates will be encouraged to specialize in one of the primary care areas such as family practice, pediatrics, or internal medicine.

Foreign medical graduates are a large part of the new supply of physicians each year. In 1974, 2 new physicians out of 5 were foreign medical graduates.

Even though the number of medical schools has increased in the last few years, the competition for first-year places in medical school is intense. In 1974, there were about 40,000 applicants for 14,000 positions.

Growth in population will create much of the need for more physicians, and a larger percentage of the population will be in the age group over 65, which uses increased physicians' services. Also, the effective demand for physicians' care will increase because of greater ability to pay, resulting from extension of prepayment programs for hospitalization and medical care, including Medicare and Medicaid, and continued Federal Government provision of medical care for members of the Armed Forces, their families, and veterans. More physicians will be needed, in additioh, for medical research, teaching in medical schools, and the continuing growth in the fields of public health, rehabilitation, industrial medicine, and mental health.

Recent concern over the distribution of physicians between specialties and general practice has resulted in creation of Federal funds for promotion of programs in family medicine. The new specialty of family practice has grown very rapidly since 1971, in keeping with the need for more M.D.'s who treat a variety of the more common illnesses.

To some extent, the rise in the demand for physicians' services will be offset by developments that will enable physicians to care for more patients. For example, increasing numbers of medical technicians are assisting physicians; new drugs and new medical techniques are shortening illnesses; and growing numbers of physicians are using their time more effectively by engaging in group practice or treating patients in physicians' offices or hospitals, rather than making house calls.

The extent to which the developing health occupations, such as those of physicians' assistants and nurse practitioners, will enable each physician to treat more patients is as yet unknown. It is possible that these new health personnel will decrease the physicians' work significantly. In addition, legislation was passed in 1972 authorizing the Veterans Administration to assist States in the establishment of up to eight new medical schools. As of early 1975, plans were under way for two of these schools to enroll their first students in 1976. Either a large increase in the number of physicians or the ability of each practitioner to treat more patients could force more physicians to establish their practice in sections of the country which have few doctors and to choose general practice or family medicine instead of one of the other specialties.

Earnings and Working Conditions

In 1974, medical school graduates serving as residents earned average annual salaries of $11,249 in hospitals affiliated with medical schools, and $12,015 in nonaffiliated hospitals, according to the American Medical Association. Many hospitals also provided full or partial room, board, and other maintenance allowances to their residents.

Graduates employed by the Federal Government in late 1974 earned an annual starting salary of about $15,500 if they had completed a 1-year post-medical school residency, and about $18,500 if they had completed 2 years of residency.

Newly qualified physicians who establish their own practice must make a sizable financial investment to equip a modern office. During the first year or two of independent practice, physicians probably earn little more than the minimum needed to pay expenses. As a rule, however, their earnings rise rapidly as their practice develops.

Physicians have the highest average annual earnings of any occupational group. The net income of physicians who provided patient care services averaged about $49,500 in 1974, according to the limited information available. Earnings of physicians depend on factors such as the region of the country in which they practice; the patients' income levels; and the physician's skill, personality, and professional reputation, as well as the length of experience. Self-employed physicians usually earn more than those in salaried positions, and specialists usually earn considerably more than general practitioners. Many physicians have long working days and irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors grow older, they may accept fewer new patients and tend to work shorter hours. However, many continue in practice well beyond 70 years of age.

Sources of Additional Information

Persons who wish to practice in a given State should find out about the requirements for licensure directly from the board of medical examiners of that State. Information on Federal scholarships and loans is available from the director of student financial aid at the individual medical schools. For a list of approved medical schools, as well as general information on premedical education, financial aid, and medicine as a career, contact:

Council on Medical Education, American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610.

Association of American Medical Colleges, Suite 200, One Dupont Circle, NW., Washington, D.C. 20036.

PODIATRISTS

(D.O.T. 079.108)

Nature of the Work

Podiatrists diagnose and treat foot diseases and deformities. They perform surgery, fit corrective devices, and prescribe drugs, physical therapy, and proper shoes. To help in diagnoses, they take X-rays and perform or prescribe blood and other pathological tests. Among the conditions podiatrists treat are corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and arch disabilities. They refer patients to medical doctors whenever the feet show symptoms of medical disorders affecting other parts of the body—such as arthritis, diabetes, or heart disease.

Some podiatrists specialize in foot surgery, orthopedics (bone, muscle, and joint disorders), podopediatrics (children's foot ailments), or podogeriatrics (foot problems of the elderly). However, most provide all types of foot care.

Places of Employment

About 7,500 persons practiced podiatry in 1974, 6 percent of them women. Most podiatrists practice in large cities. Those who had full-

time salaried positions worked mainly in hospitals, podiatric colleges, or for other podiatrists. The Veterans Administration and public health departments employ podiatrists on either a full- or part-time basis. Others serve as commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must graduate from an accredited program in a college of podiatric medicine and pass a State board examination. Three States—Michigan, New Jersey, and Rhode Island—also require applicants to serve a 1-year internship in a hospital or clinic after graduation. Three-fourths of the States grant licenses without further examination to podiatrists licensed by another State.

Applicants to the six colleges of podiatric medicine must have completed at least 2 years of college including courses in English, chemistry, biology or zoology, physics, and mathematics. About 90 percent of all applicants have a bachelor's degree.

The first 2 years in podiatry school include classroom instruction and laboratory work in basic sciences such as anatomy, bacteriology, chemistry, pathology, physiology, and pharmacology. During the final 2 years, students obtain clinical experience. The degree of Doctor of Podiatric Medicine (D.P.M.) is awarded upon graduation. Additional education and experience are generally necessary to practice in a specialty. A limited number of Federal loans are available for needy students to pursue full-time study leading to a degree in podiatry.

Young people planning a career in podiatry should have scientific aptitude and manual dexterity, and like detailed work. A good business sense, congeniality, and a sense of responsibility are additional assets in the profession.

Most newly licensed podiatrists set up their own practices. Some purchase established practices, or obtain salaried positions to gain the experience and money needed to begin their own.

Employment Outlook

Opportunities for graduates to establish new practices, as well as to enter salaried positions, should be favorable through the 1970's.

Through the mid-1980's, employment of podiatrists is expected to grow about as fast as the average for all occupations as a result of greater demand for health services by an expanding population, particularly the growing number of older people. This age group, the one needing the most foot care, is entitled to certain podiatrists' services under Medicare. Furthermore, the trend toward providing preventive foot care for children is increasing. More podiatrists also will be needed to furnish services in hospitals, extended care facilities, and public health programs.

Earnings and Working Conditions

Experience and the income level and location of the community served have a great effect on earnings of individual podiatrists. Those in practice between 1 and 3 years earned an average net income of about $20,000 in 1974, according to the limited available information. Net incomes of podiatrists with from 3 to 6 years of practice averaged about $35,000.

The workweek is generally 40 hours, and they may set their hours to suit their practice.

Sources of Additional Information

Information on license requirements in a particular State is available from the State board of examiners in the State capital.

Information on colleges of podiatric medicine, entrance requirements, curriculums, and scholarships is available from:

American Association of Colleges of Podiatric Medicine, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

For additional information on podiatry as a career, contact:

American Podiatry Association, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

VETERINARIANS

(D.O.T. 073.081 through .281)

Nature of the Work

Veterinarians (doctors of veterinary medicine) diagnose, treat, and control diseases and injuries among animals. Their work is important for the Nation's food production. It is also important for public health, because it helps to prevent the outbreak and spread of animal diseases, many of which can be transmitted to human beings.

Veterinarians treat animals in hospitals and clinics or on the farm and ranch. They perform surgery on sick and injured animals and prescribe and administer drugs, medicines, and vaccines.

About one-third of all veterinarians treat small animals or pets exclusively. About the same number treat a mix of both large and small animals. A large number specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. Many veterinarians inspect meat, poultry, and other foods as part of Federal and State public health programs. Others teach in veterinary colleges. Some do research related to animal diseases, foods and drugs, or work as part of a medical research team to seek knowledge about prevention and treatment of human disease.

Places of Employment

There were about 29,000 veterinarians active in 1974—3 percent of them women. About 7 out of 10 veterinarians were in private practice. The Federal Government employed about 2,500 veterinarians, chiefly in the U.S. Department of Agriculture and the U.S. Public Health Service. About 800 more were commissioned officers in the veterinary services of the Army and Air Force. Other employers of veterinarians are State and local government agencies, international health agencies, colleges of veterinary medicine, medical schools, research and development laboratories, large livestock farms, animal food companies, and pharmaceutical companies that manufacture drugs for animals.

Although veterinarians are located in all parts of the country, the type of practice generally varies according to geographic setting. Veterinarians in rural areas chiefly treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets.

Training, Other Qualifications, and Advancement

Veterinarians must be licensed to practice in all States and the District of Columbia. To obtain a license, applicants must have a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree and pass a State board examination. A few States also require that applicants have some practical experience under the supervision of a licensed veterinarian. Some States issue licenses without further examination to veterinarians already licensed by another State.

For positions in research and teaching, an additional master's or Ph. D. degree usually is required in a field such as pathology, physiology, or bacteriology.

Minimum requirements for the D.V.M. or V.M.D. degree are 2 years of preveterinary college work that emphasize the physical and biological sciences, followed by 4 years of study in a college of veterinary medicine. However, two professional schools require 3 years of preveterinary study. Most veterinary school applicants have completed 3 to 4 years of college before entering the professional program. Veterinary college training includes considerable practical experience in diagnosing and treating animal diseases and performing surgery, and laboratory work in anatomy, biochemistry, and other scientific and medical subjects.

There were 19 colleges of veterinary medicine in the United States in 1974. When selecting students for admission, these colleges considered primarily the applicants' scholastic records and the amount and character of their preveterinary training. Residents of the State in which each college is located usually are given preference by that college since these schools are largely State supported. In the South and West, regional educational plans permit cooperating States without veterinary schools to send students to designated regional schools. In other areas, colleges which accept a certain number of students from other States usually give priority to applicants from nearby States that do not have veterinary schools.

Federal funds provide a limited number of loans for needy students pursuing full-time study leading to a degree in veterinary medicine.

Most veterinarians begin as employees or partners in established practices. A few start their own practices with a modest financial investment in drugs, instruments, and an automobile. With a more substantial investment, one may open an animal hospital or purchase an established practice. Newly qualified veterinarians may enter the Army and Air Force as commissioned officers, or qualify for Federal positions as meat and poultry inspectors, disease-control workers, epidemiologists, research assistants, or commissioned officers in the U.S. Public Health Service.

Employment Outlook

Employment opportunities for veterinarians are expected to be favorable through the mid-1980's. Veterinary employment is expected to grow faster than the average for all occupations through the mid-1980's, primarily because of growth in the pet population, an increase in the numbers of livestock and poultry needed to feed an expanding population, and an increase in veterinary research. Emphasis on scientific methods of raising and breeding livestock and poultry and growth in public health and disease control programs also will contribute to the demand for veterinarians.

Earnings and Working Conditions

Newly graduated veterinarians employed by the Federal Government started at $13,697 a year in late 1974. Salaries of experienced veterinarians employed by the Department of Agriculture ranged between $17,500 and $35,000 a year. The incomes of veterinarians in private practice vary considerably, depending on such factors as location, type of practice, and years of experience, but usually are higher than those of other veterinarians, according to the limited data available.

Veterinarians sometimes may be exposed to danger of injury, disease, and infection. Those in private practice often have long and irregular working hours. Veterinarians in rural areas may have to spend much time traveling to and from farms and may have to work outdoors in all kinds of weather. Because they are self-employed, veterinarians in private practice usually can continue working well beyond normal retirement age.

Sources of Additional Information

A pamphlet entitled *Today's Veterinarian* presents additional information on veterinary medicine as a career, as well as a list of colleges of veterinary medicine. A free copy may be obtained by submitting a request, together with a self-addressed stamped business size envelope, to:

American Veterinary Medical Association, 930 N. Meacham Rd., Schaumburg, Ill. 60172.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Agricultural Research Service, U.S. Department of Agriculture, Hyattsville, Md. 20782.

Animal and Plant Health Inspection Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

Agricultural Marketing Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

Students seeking loan or scholarship assistance should send inquiries to the schools in which they are interested.

OTHER HEALTH OCCUPATIONS

Many other highly skilled workers provide important health services in addition to medical practitioners. For many of these occupations at least a bachelor's degree is required, and for others college education is becoming increasingly essential. Some provide specialized types of health care, but others perform a broad range of services.

The following occupations are discussed in this section: Dental hygienists, dietitians, health service administrators, medical laboratory workers, medical record administrators, occupational therapists, pharmacists, physical therapists, registered nurses, respiratory therapists, and speech pathologists and audiologists.

DENTAL HYGIENISTS

(D.O.T. 078.368)

Nature of the Work

Dental hygienists are oral health clinicians and educators who aid the public in developing and maintaining good oral health. As members of the dental health team, dental hygienists may perform preventive and therapeutic services under the supervision of the dentist. Specific responsibilities of the hygienist vary, depending on the law of the State where the hygienist is employed, but may include: removing deposits and stains from patients' teeth; providing instructions for patient self-care, and dietetic and nutritional counseling; and the application of medicine for the prevention of tooth decay. They take medical and dental histories, expose and develop dental X-ray films, make model impressions for study, and prepare other diagnostic aids for use by the dentist. Pain control and restorative procedures also are handled often by dental hygienists.

Dental hygienists who work in school systems examine children's teeth, assist dentists in determining the dental treatment needed, and report their findings to parents. They also clean teeth and give instruction on correct mouth care. Some help to develop classroom or assembly programs on oral health. Dental hygienists employed by health agencies work in dental clinics. A few assist in research projects. Those having advanced training may teach in schools of dental hygiene.

Places of Employment

Nearly 23,000 persons, most of them women, worked as dental hygienists in 1974. Many work part time. Most work in private dental offices. Public health agencies, school systems, industrial plants, clinics, hospitals, dental hygiene schools, and the Federal Government are other sources of employment for dental hygienists. Some who are graduates of bachelor's degree programs are commissioned officers in the Armed Forces.

Training and Other Qualifications

Dental hygienists must be licensed. To get a license, a candidate must be a graduate of an accredited dental hygiene school, except in Alabama, and pass both a written and clinical examination. In 1974, candidates in 49 States and the District of Columbia could complete part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners.

In order to practice in a different State, a licensed dental hygienist must pass the State's examination. However, at least 19 States grant licenses, without further examination, to dental hygienists already licensed in certain other States.

In 1975, 163 schools of dental hygiene in the United States were accredited by the American Dental Association. Most programs grant a certificate or an associate degree; others lead to a bachelor's degree. Some institutions offer both types of programs. Twelve schools offer master's degree programs.

Completion of an associate degree program is sufficient for dental hygienists who want to practice in a private dental office. In order to do research, teach, and work in public or school health programs, a baccalaureate degree usually is required.

The minimum requirement for admission to a school of dental hygiene is graduation from high school. Several schools which offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college. Many schools also require that applicants take an aptitude test given by the American Dental Hygienists Association.

The curriculum in a dental hygiene program consists of courses in the basic sciences, dental sciences, and liberal arts. These schools offer laboratory work, clinical experience, and classroom instruction in subjects such as anatomy, chemistry, histology, periodontology, pharmacology, and nutrition.

People who want to become dental hygienists should be those who enjoy working with others. The ability to put patients at ease in an uncomfortable situation is helpful. Personal neatness and cleanliness, manual dexterity, and good health also are important qualities. Among the courses recommended for high school students interested in careers in this occupation are biology, health, chemistry, and speech.

Employment Outlook

Employment opportunities for dental hygienists are expected to be very good through the mid-1980's. Despite an anticipated rise in the number of graduates from schools of dental hygiene, the demand is expected to be greater than the number available for employment if current trends in enrollments continue. There also should be very good opportunities for those desiring part-time employment, and for those willing to work in rural areas.

Employment of dental hygienists is expected to grow much faster than the average for all occupations, because of an expanding population and the growing awareness of the importance of regular dental care. Increased participation in dental prepayment plans and more group practice among dentists will result in new jobs for dental hygienists. Dental care programs for children also may lead to more employment opportunities in this field.

Dental hygienists teach the techniques of mouth care.

Earnings and Working Conditions

Earnings of dental hygienists are affected by the type of employer, education and experience of the individual hygienist, and the geographic location. Dental hygienists who work in private dental offices usually are salaried employees, although some are paid a commission for work performed, or a combination of salary and commission.

Dental hygienists working full time earned average salaries of about $10,400 a year in 1974, according to the limited data available. This salary was slightly above the average for all nonsupervisory workers in private industry, except farming. In late 1974, the Federal Government paid dental hygienists with no experience starting salaries of $7,596 a year.

Dental hygienists employed full time in private offices usually worked between 35 and 40 hours a week. They may work on Saturdays or during evening hours. Some hygienists work for two dentists or more.

Dental hygienists usually work in clean, well-lighted offices. Important health protections for persons in this occupation are regular medical checkups and strict adherence to established procedures for using X-ray equipment and for disinfection.

Dental hygienists who work for school systems, health agencies, and the Federal or State governments have the same hours, vacation, sick leave, retirement, and health insurance benefits as other workers in these organizations.

Sources of Additional Information

For information about accredited programs and the educational requirements needed to enter this occupation, contact:

Office of Education, American Dental Hygienists Association, 211 E. Chicago Ave., Chicago, Ill. 60611.

Other material on opportunities for dental hygienists is available from:

Division of Dentistry, Public Health Service, U.S. Department of Health, Education, and Welfare, 9000 Rockville Pike, Bethesda, Md. 20014.

The State Board of Dental Examiners in each State, or the National Board of Dental Examiners, 211 E. Chicago Ave., Chicago, Ill. 60611, can supply information on licensing requirements.

DIETITIANS

(D.O.T. 077.081 through .168)

Nature of the Work

Dietitians plan nutritious and appetizing meals to help people maintain or recover good health. They also supervise the food service workers who prepare and serve the meals, manage purchases and keep the accounts, and give advice on good eating habits. Administrative dietitians form the largest group in this occupation; the others are clinical, teaching, and research dietitians. Nutritionists also are included in this field.

Administrative dietitians apply the principles of nutrition and sound management to large-scale meal planning and preparation, such as that done in hospitals, universities, schools, and other institutions. They supervise the planning, preparation, and service of meals; select, train, and direct food-service supervisors and workers; budget for and purchase food, equipment, and supplies; enforce sanitary and safety regulations; and prepare records and reports. Dietitians who are directors of a dietetic department also decide on departmental policy; coordinate dietetic service with the activities of other departments; and are responsible for the development and management of the dietetic department budget, which in large organizations may amount to millions of dollars annually.

Clinical dietitians, sometimes called therapeutic dietitians, plan diets and supervise the service of meals to meet the nutritional needs of patients in hospitals, nursing homes, or clinics. Among their duties, clinical dietitians confer with doctors and other members of the health care team about patients' nutritional care, instruct patients and their families on the requirements and importance of their diets, and suggest ways to help them stay on these diets after leaving the hospital or clinic. In a small institution, one person may be both the administrative and clinical dietitian.

Research dietitians conduct, evaluate, and interpret research to improve the nutrition of both healthy and sick people. This research may be in nutrition science and education, food management, or food service systems and equipment. They conduct studies and make surveys of food intake, food acceptance, and food utilization. Research projects may relate to subjects such as nutritional needs of the aging, persons with a chronic disease, or space travelers. Research dietitians usually are employed in medical centers or education facilities, but also may work in community health programs. (See statement on Food Scientists elsewhere in this book.)

Dietetic educators teach nutrition to dietetic, medical, dental, and nursing students and to interns, residents, and other members of the health care team. This may be in medical and educational institutions.

Nutritionists counsel people of all ages, as individuals or in groups, on sound nutrition practices to maintain and improve health. This includes special diets, meal planning and preparation, and food budgeting and purchasing. Nutritionists in the public health field are responsible for planning, developing, administering, and coordinating nutrition programs and services as part of public health programs. Nutritionists work in such diverse areas as food industries, educational and health facilities, and agricultural and welfare agencies, both public and private.

An increasing number of dietitians work as consultants to hospitals and to health-related facilities. Others act as consultants to commercial enterprises, including food processors and equipment manufacturers.

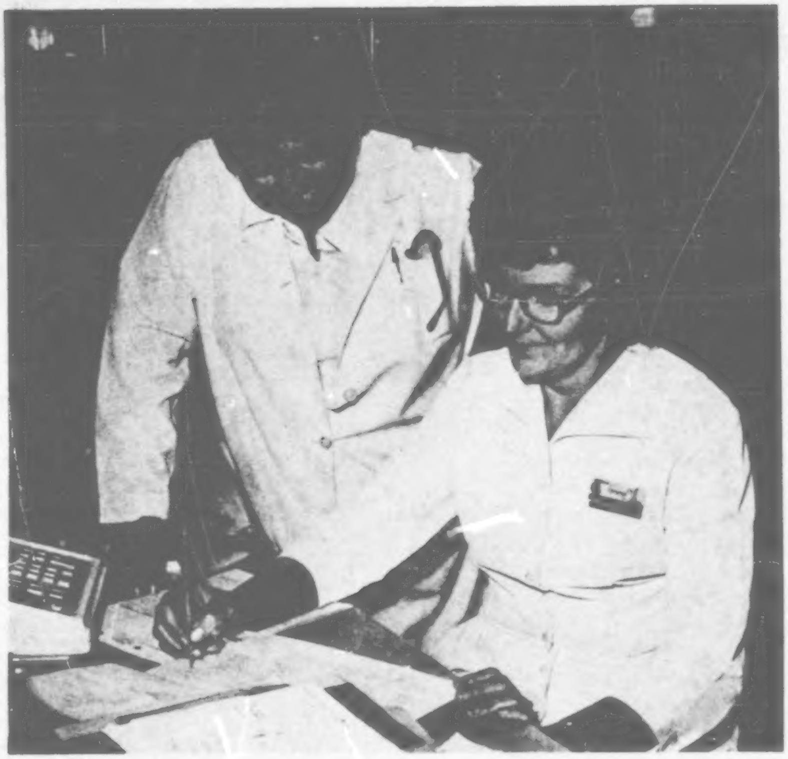
Places of Employment

About 33,000 persons, most of them women, worked as dietitians in 1974. More than two-fifths work in hospitals, nursing homes, and clinics, including about 1,000 in the Veterans Administration and the U.S. Public Health Service. Colleges, universities, and school systems employ a large number of dietitians as teachers or in food service systems. Most of the rest work for health-related agencies, restaurants or cafeterias, and large companies that provide food service for their employees. Some dietitians are commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

A bachelor's degree, preferably with a major in foods and nutrition or institution management, is the basic educational requirement for dietitians. This degree can be earned in more than 250 colleges and universities, usually in departments of home economics. College courses usually required are in food and nutrition, institution management, chemistry, bacteriology, physiology, and related courses such as mathematics, data processing, psychology, sociology, and economics.

For a dietitian to qualify for professional recognition, the American Dietetic Association (ADA) recommends the completion after graduation of an approved dietetic internship or an approved individual traineeship program. The internship lasts 6 to 12 months and the traineeship program 1 to 2 years. Both programs combine clin-



ical experience under a qualified dietitian with some classroom work. In 1974, 71 internship programs were approved by the American Dietetic Association. A growing number of coordinated undergraduate programs, located in schools of medicine and in allied health and home economics departments of both colleges and universities, enable students to complete both the requirements for a bachelor's degree and the clinical experience requirement in 4 years.

Experienced dietitians may advance to assistant or associate director or director of a dietetic department. Advancement to higher level positions in teaching and research usually requires graduate education; public health nutritionists must earn a graduate degree in this field. Graduate study in institutional or business administration is valuable to those interested in administrative dietetics.

Persons who plan to become dietitians should have organizational and administrative ability, as well as high scientific aptitude, and should be able to work well with a variety of people. Among the courses recommended for high school students interested in careers as dietitians are home economics, business administration, biology, health, mathematics, and chemistry.

Employment Outlook

Employment opportunities for qualified dietitians on both a full-time and part-time basis are expected to be good through the mid-1980's. In recent years, employers increasingly have utilized dietetic assistants trained in vocational and technical schools and dietetic technicians educated in junior colleges to help meet demands for dietetic services. Since this situation is likely to persist, employment opportunities also should continue to be favorable for graduates of these programs.

Employment of dietitians is expected to grow faster than the average for all occupations through the mid-1980's to meet the nutrition and food management needs of hospitals and extended care facilities, industrial plants, and restaurants. Dietitians also will be needed to staff community health programs and to conduct research in food and nutrition. In addition to new dietitians needed because of occupational growth, many others will be required each year to replace those who die, retire, or leave the profession for other reasons.

Earnings and Working Conditions

Starting salaries of hospital dietitians averaged $9,900 a year in 1974, according to a national survey conducted by the University of Texas Medical Branch. Experienced dietitians received annual salaries ranging from $12,100 to $22,000, according to the American Dietetic Association. Colleges and universities paid dietitians with bachelor's degrees median salaries of $12,100 a year in 1974. Those with bachelor's degrees working in commercial or industrial establishments received median salaries of $12,500 a year; those in public and voluntary health agencies, $10,800. Self-employed dietitians with a bachelor's degree earned median salaries over $14,000 a year, in 1974.

The entrance salary in the Federal Government for those completing an approved internship was $10,520 in late 1974. Beginning dietitians with a master's degree who had completed an internship earned $12,841. In late 1974, the Federal Government paid experienced dietitians average salaries of $17,414 a year.

Most dietitians work 40 hours a

week; however, dietitians in hospitals may sometimes work on weekends, and those in commercial food service have somewhat irregular hours. Some hospitals provide laundry service and meals in addition to salary. Dietitians usually receive paid vacations, holidays, and health insurance and retirement benefits.

Sources of Additional Information

For information on approved dietetic internship programs, scholarships, and employment opportunities, and a list of colleges providing training for a professional career in dietetics, contact:

The American Dietetic Association, 430 North Michigan Ave., 10th floor, Chicago, Ill. 60611.

The U.S. Civil Service Commission, Washington, D.C. 20415, will send information on the requirements for dietetic interns and dietitians in Federal Government hospitals and for public health nutritionists in the Indian Health Service of the Public Health Service and in the District of Columbia government.

HEALTH SERVICES ADMINISTRATORS

(D.O.T. 169.168, 187.118, and 187.168)

Nature of the Work

Medical and health care is provided by organizations that vary from large teaching hospitals to small walk-in clinics. Each of these requires effective management to function properly. Health administrators, under the general supervision of boards of directors or other governing bodies, provide this management.

Administrators coordinate the various functions and activities that combine to make an organization work. They may do this personally, where the organization is small, or through a staff of assistant administrators in larger organizations. They make management decisions on matters such as the need for additional personnel and equipment, current and future space requirements, and the budget.

Some health services administrators, including those who manage hospitals or nursing homes, oversee nursing and food services, and in-service training programs. Although assistant administrators usually direct the daily operations of these departments, the chief executive remains informed through formal and informal meetings with assistants, the medical staff, and others. In addition to these management activities, many health administrators help to carry out fundraising drives and promote the public's participation in health programs. This phase of the administrator's job often includes speaking before civic groups, arranging publicity, and coordinating the activities of the organization with those of government or community agencies.

Places of Employment

About 150,000 persons worked as health services administrators in 1974—nearly half of them were women. Most administrators work for health facilities, including hospitals (which employed 4 out of every 10 administrators), nursing and personal care homes, and health management firms that provide administrative services to health facilities at a specified contract price.

Some health administrators work for government agencies, including State and local health departments and the U.S. Public Health Service. In addition, the Federal Govern-

ment hires administrators in Veterans Administration and Armed Forces hospitals and clinics. Others work for voluntary health agencies that conduct research and provide care and treatment for victims of particular diseases or physical impairments.

Training, Other Qualifications, and Advancement

Educational requirements for health services administrators vary according to the position's level of responsibility and the size of the organization. Generally, larger organizations with more complicated administrative structures require higher credentials than smaller ones.

Applicants with a master's degree in health or hospital administration may be hired as associate or assistant administrators in hospitals, while those with master's degrees in public health often find work as program analysts or program representatives in public health departments. Very few master's degree recipients find entry positions in nursing or personal care homes, although many nursing home administrators pursue graduate education while employed.

Bachelor's degree recipients usually begin their careers as administrative assistants or department heads in hospitals, or as assistant administrators in nursing homes. Graduates of 2-year, associate degree programs generally are hired as unit directors or assistant department heads in hospitals, or as assistants to program representatives in public health departments. Some associate degree holders find assistant administrator jobs in small nursing homes.

The Ph. D. degree usually is required for positions in teaching or research, and the doctorate is an asset for those seeking administrative jobs in the larger, more prestigious health organizations. Although some public health departments still require chief administrators to be physicians, the trend is away from this.

Administrators in Armed Forces hospitals are career military personnel.

In 1974, about 40 bachelor and associate degree programs in health services administration were offered—the majority were 4-year curriculums. In addition, about 40 programs in hospital or health services administration led to the master's degree, and 17 schools of public health offered programs toward a master's degree in public health.

To enter graduate programs, applicants must have a bachelor's degree, with courses in natural sciences, psychology, sociology, statistics, accounting, and economics. The programs generally last about 2 years and include some supervised administrative experience in hospitals, clinics, or health agencies. Programs may include courses such as hospital organization and management, accounting and budget control, personnel adminstration, public health administration, and the economics of health care.

In all 50 States and the District of Columbia, the administrator of a nursing or personal care home must be licensed. Requirements are not uniform, but they generally specify a level of education, such as a bachelor's degree, plus some amount of experience in the field.

Personal qualifications needed for success as a health administrator include initiative and an interest in helping the sick. Administrators should be able to work with and motivate people, and organize and direct large-scale activities. They also should enjoy public speaking.

Health administrators advance in the profession by taking increasingly more responsible positions. For example, some hospital administrators begin their careers in small hospitals in positions with broad responsibilities, such as assistant administrator. They advance by moving to jobs as associate or chief administrator in larger hospitals. More commonly, they start in a large institution in a position that is somewhat narrow in scope; for example, as department head in charge of purchasing. Regardless of the path of advancement chosen, the ultimate occupational goal in hospitals and nursing homes is the job of chief executive or chief administrative officer.

Employment Outlook

The number of graduate programs in health administration has increased rapidly in recent years and administative specialists with graduate degrees in other fields also have entered the profession. Consequently, it may become increasingly difficult for those with less than graduate education to enter health administration in top management positions. In addition, some administrative jobs will continue to be filled by physicians, registered nurses, and members of religious communities.

Employment of health services administrators is expected to grow much faster than the average for all occupations to 1985 as the quality and quantity of patient services increase and hospital management becomes more complex. The demand for administrators will be stimulated by the formation of more group medical practices and health maintenance organizations (facilities that offer subscribers a broad range of medical services for a monthly fee paid in advance). Administrators also will be needed in nursing and convalescent homes to handle the increasing amount of administrative work expected as these facilities expand in size.

Earnings and Working Conditions

Salaries of hospital administrators depend on factors such as the level of job responsibility and the size, type, and location of the hospital, and the size of its administrative staff and budget. The average starting salary of administrative assistants in hospitals was about $10,500 in 1974, according to the limited information available.

Chief administrators in hospitals with 100 or fewer beds earned from about $16,500 to $20,000 a year in 1974. Some, in larger hospitals, earned over $40,000. Recent recipients of master's degrees in health administration starting work in Veterans Administration (VA) hospitals earned $12,167 a year in 1974. The average salary paid administrators of Federal hospitals was $23,000.

Commissioned officers in the Armed Forces who work as hospital administrators hold ranks ranging from second lieutenant to colonel or from ensign to captain. Commanding officers of large Armed Forces hospitals are physicians, who may hold higher ranks. Hospital administrators in the U.S. Public Health Service are commissioned officers holding ranks ranging from lieutenant (junior grade) to captain in the Navy.

Administrators of nursing and personal care homes usually earn lower salaries than those paid hospital administrators in facilities having similar numbers of beds. Most administrators employed by voluntary health agencies earned between $15,000 and $30,000 a year in 1974.

Health administrators often work long hours. Because health facilities such as nursing homes and hospitals operate around the clock, administrators in these institutions may be called at all hours to settle emergency problems. Also, some travel may be required to attend meetings or, in the case of State public health department and voluntary health agency administrators, to inspect facilities in the field.

Sources of Additional Information

Information about health administration and the academic programs in this field offered by universities, colleges, and community colleges is available from:

American College of Hospital Administration, 840 North Lake Shore Drive, Chicago, Illinois 60604.

Association of University Programs in Health Administration, One Dupont Circle, NW., Washington, D.C. 20036.

American Public Health Association, Division of Program Services, 1015 18th St., NW., Washington, D.C. 20036.

National Health Council, Health Careers Program, 1740 Broadway, New York, N.Y. 10019.

MEDICAL LABORATORY WORKERS

(D.O.T. 078.128, .168, .281, and .381)

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of many diseases. Medical laboratory workers, often called clinical laboratory workers, include three levels: medical technologists, technicians, and assistants. They perform tests under the direction of pathologists (physicians who diagnose the causes and nature of disease) and other physicians, or scientists who specialize in clinical chemistry, microbiology, or the other biological sciences. Medical laboratory workers analyze the blood, tissues, and fluids in the human body by using precision instruments such as microscopes and automatic analyzers.

Medical technologists, who require 4 years of postsecondary training, perform complicated chemical, microscopic, and bacteriological tests. These tests may include chemical tests to determine, for example, the blood cholesterol level, or microscopic examination of the blood to detect the presence of diseases such as leukemia. Technologists microscopically examine other body fluids; make cultures of body fluid or tissue samples to determine the presence of bacteria, parasites, or other micro-organisms; and analyze the samples for chemical content or reaction. They also may type and cross-match blood samples.

Technologists in small laboratories often perform many types of tests. Those in large laboratories usually specialize in areas such as microbiology, parasitology, biochemistry, blood banking, hematology (the study of blood cells), and nuclear medical technology (the use of radioactive isotopes to help detect diseases).

Most medical technologists conduct tests related to the examination and treatment of patients and may be called on to display independent judgment. Some do research, develop laboratory techniques, teach, or perform administrative duties.

Medical laboratory technicians, who generally require 2 years of postsecondary training, perform a wide range of tests and laboratory procedures that require a high level of skill but not the technical knowledge of the highly trained technologists. Like technologists, they may work in several areas or specialize in one field.

Medical laboratory assistants, who generally have a year or less of formal training, assist medical technologists and technicians in routine tests and related work that can be learned in a relatively short time. In large laboratories, they may concentrate in one area of work. For example, they may identify slides with abnormal blood cells. In addition to performing routine tests, assistants may store and label plasma; clean and sterilize laboratory equipment, glassware, and instruments; prepare solutions following standard laboratory formulas and procedures; keep records of tests; and identify specimens.

Places of Employment

About 175,000 people worked as medical laboratory workers in 1974. About 80 percent of all medical laboratory workers were women; however, the number of men in the field has been increasing in recent years.

Most medical laboratory personnel work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. These places are concentrated in larger cities and populous States.

In 1974, Veterans Administration hospitals and laboratories employed about 1,900 medical technologists and about 1,900 medical laboratory technicians and assistants. Others worked for the Armed Forces and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

The minimum educational requirement for a beginning job as a medical technologist usually is 4 years of college training including completion of a specialized training program in medical technology.

Undergraduate work includes courses in chemistry, biological science, and mathematics. These studies give the technologist a broad understanding of the scientific principles underlying laboratory work. Specialized training usually requires 12 months of study and includes extensive laboratory work. In 1974, about 730 hospitals and schools offered programs approved by the American Medical Association. These programs were affiliated with colleges and universities; a bachelor's degree is usually awarded upon completion. A few schools require a bachelor's degree for entry into the program.

Many universities also offer advanced degrees in medical technology and related subjects for technologists who plan to specialize in laboratory work or in teaching, administration, or research.

Medical laboratory technicians employed in 1974 got their training in a variety of educational settings. Many attended junior or 4-year colleges and universities for 1 year or more. Others were trained in the Armed Forces. Some technicians received training in private and nonprofit vocational and technical schools.

Most medical laboratory assistants employed in 1974 were trained on the job. In recent years, however, an increasing number have studied in 1-year training programs conducted by hospitals, junior colleges in cooperation with hospitals, or vocational schools. Hospitals offer the greatest number of training programs. Applicants to these programs should be high school graduates with courses in science and mathematics. The programs include classroom instruction and practical training in the laboratory. They often begin with a general orientation to the clinical laboratory followed by courses in bacteriology, serology, parasitology, hematology, clinical chemistry, blood banking, and urinalysis.

Certification or registration is considered important in this field because it indicates that the persons certified have met educational standards recognized by the certifying body. After the successful completion of the appropriate examinations, medical technologists may be certified as Medical Technologists, MT (ASCP), by the Board of Registry of the American Society of Clinical Pathologists; Medical Technologists, MT, by the American Medical Technologists; or Registered Medical Technologists, RMT, by the International Society of Clinical Laboratory Technology. These organizations also certify technician-level workers. Laboratory assistants are certified by the American Society of Clinical Pathologists.

Medical technologists and technicians must be licensed in Alabama, California, Florida, Georgia, Hawaii, Illinois, Nevada, Pennsylvania, Tennessee, New York City, and Puerto Rico. Requirements for licensure include a written examination in some States.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and normal color vision are highly desirable.

Persons interested in medical laboratory careers should use considerable care in selecting a training program. They should get information about the kinds of jobs obtained by graduates, educational costs, the accreditation of the school, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Technologists may advance to supervisory positions in certain areas of laboratory work, or, after several years' experience, to chief medical technologist in a large hospital. Graduate education in one of the biological sciences or chemistry usually speeds advancement. Technicians can advance to technologists by getting additional education and experience.

Employment Outlook

Employment of medical laboratory workers is expected to expand faster than the average for all occupations through the mid-1980's, as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of disease. Indirectly influencing growth in the field are population growth, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services.

The use of automated laboratory test equipment is expected to lead to an increase in the number of medical laboratory technicians and assistants relative to technologists. Through technological advances, technicians and assistants can operate equipment to perform tests which previously required the skill of a technologist.

Technologists will be needed to fill supervisory positions in all laboratories. Also, some will be needed in laboratories where they are required by State licensing authorities or third party health insurance regulations, and in laboratories not using the new automated equipment.

Despite an anticipated strong demand for medical laboratory workers through the mid-1980's, the number seeking to enter the field is expected to exceed the number of openings from growth and replacement needs. Consequently, jobseekers in this field may face competition for positions of their choice.

Earnings and Working Conditions

Salaries of medical laboratory workers vary by employer and geographic location. In general, medical laboratory workers employed on the west coast and in large cities received the highest salaries.

Starting salaries for medical technologists in hospitals and medical centers averaged about $9,200 in 1974, according to a survey conducted by the University of Texas Medical Branch. Beginning salaries for laboratory assistants averaged about $6,900. Technicians earn salaries that range between those paid technologists and assistants.

The Federal Government paid newly graduated medical technologists with bachelor's degrees starting salaries of $8,500 a year in late 1974. Those having experience, superior academic achievement, or a year of graduate study entered at $10,520. The Federal Government paid medical laboratory assistants and technicians starting salaries ranging from $5,294 to $8,500 a year in late 1974, depending on the amount and type of education and experience. Medical technologists in the Federal Government averaged $13,300 a year and medical technicians, $11,400 a year, in late 1974.

Medical laboratory personnel generally work a 40-hour week. In hospitals, they can expect some night and weekend duty. Hospitals normally provide vacation and sick leave benefits; some have retirement plans.

Laboratories generally are well-lighted and clean. Although unpleasant odors and specimens of many kinds of diseased tissue often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

Sources of Additional Information

Information about education and training for medical technologists, technicians, and laboratory assistants meeting standards recognized by the American Medical Association, the U.S. Office of Education, or both, as well as career information on these fields of work, is available from:

American Society of Clinical Pathologists, Board of Registry, 2100 W. Harrison St., Chicago, Ill. 60612.

American Society for Medical Technology, 5555 W. Loop South, Bellaire, Tex. 77401.

American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068.

Accrediting Bureau of Medical Laboratory Schools, Oak Manor Office, 3038 W. Lexington Ave., Elkhart, Indiana 46514.

For information about other technician training programs, contact:

International Society for Clinical Laboratory Technology, 805 Ambassador Building, 411 N. Seventh St., St. Louis, Mo. 63101.

Information about employment opportunities in Veterans Administration hospitals is available from the Office of Personnel (O54E), Veterans Administration, Washington, D.C. 20420.

Information about clinical and research employment opportunities with the National Institutes of Health is available from the Clinical

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MEDICAL RECORD ADMINISTRATORS

(D.O.T. 100.388)

Nature of the Work

All health care institutions keep records that contain medical information on each patient, including case histories of illnesses or injuries, reports on physical examinations, X-rays and laboratory tests, doctors' orders and notes, and nurses' notes. These records are necessary for correct and prompt diagnosis and treatment of illnesses and injuries. They also are used for research, insurance claims, legal actions, evaluation of treatment and medications prescribed, and in the training of medical personnel. Medical information in hospitals is also used to evaluate patient care provided in the hospital and as a basis for health care planning for the community.

Medical record administrators, formerly known as medical record librarians, direct the activities of the medical record department and develop systems for documenting, storing, and retrieving medical information. They supervise the medical record staff which processes and analyzes records and reports on patients' illnesses and treatment. They train members of the medical record staff for specialized jobs, compile medical statistics required by State or National health agencies, and assist the medical staff in evaluations of patient care or research studies. Medical record administrators serving as department heads are a part of the hospital management staff and participate fully in management activities. As the administrators responsible for the medical information system, they may be required to testify in court about records and record procedures.

The size and type of institution affect the duties and amount of responsibility assigned to medical record administrators. In large hospitals, chief medical record administrators supervise other medical record administrators, technicians, and clerks. Smaller hospitals may employ only two or three persons in the medical record department and in nursing homes usually one person keeps the medical records. In these cases a consulting medical record administrator usually advises technical and clerical personnel performing medical record functions.

Places of Employment

Most of the nearly 12,000 medical record administrators employed in 1974 worked in hospitals. The remainder worked in clinics, nursing homes, State and local public health departments, and medical research centers. Some health insurance companies also employ medical record administrators to help determine liability for payment of their clients' medical fees. Some medical record administrators work for firms that manufacture equipment for recording and processing medical data and develop and print health insurance and medical forms. Many small health care facilities hire medical record administrators as consultants. Although most medical record administrators are women, the number of men in the occupation is growing.

Training, Other Qualifications, and Advancement

Preparation for a career as a medical record administrator is offered in specialized programs in colleges and universities. Most programs last 4 years and lead to a bachelor's degree in medical record administration. However, concentration in medical record administration begins in the third or fourth year of study, making transfer from a junior college possible. One-year certificate programs also are available for those who already have a bachelor's degree and required courses in the liberal arts and biological sciences. In 1974, there

Assistance

were 40 programs in medical record administration approved by the Council on Medical Education of the American Medical Association and the American Medical Record Association (AMRA). High school courses that are useful include health, business administration, mathematics, and biology.

Training for medical record administrators includes both classroom instruction and practical experience. Anatomy, physiology, fundamentals of medical science, medical terminology, and medical record science are among the required scientific courses. In addition, management courses such as hospital organization and administration, health law, statistics, and data processing are part of the curriculum. Experience in the medical record departments of hospitals provides students with a practical background in applying standardized medical record practices, compiling statistical reports, analyzing data, and organizing medical record systems.

Graduates of approved schools in medical record administration are eligible for the national registration examination given by AMRA. Passing this examination gives professional recognition as a Registered Record Administrator (RRA). There were about 5,000 employed RRA's in 1974, according to AMRA.

Medical record administrators must be accurate and interested in detail. They also must be able to communicate clearly in speech and writing. Because medical records are confidential, medical record administrators must be discreet in processing and releasing information. Supervisors must be able to organize and analyze work procedures and to work effectively with other hospital personnel.

Medical record administrators with some experience in smaller health facilities may advance to positions as department heads in large hospitals or to higher level positions in hospital administration. Some coordinate the medical record departments of several small hospitals. Others move on to medical record positions in health agencies. Many teach in the expanding programs for medical record personnel in 2- and 4-year colleges and universities.

Employment Outlook

Employment opportunities for graduates of approved medical record administrator programs are expected to be very good through the mid-1980's. Employment is expected to grow faster than the average for all occupations, with the increasing use of hospitals and other health facilities as more and more people are covered by health insurance. The detailed information required by third-party payers such as insurance companies and Medicare also will cause some growth in the occupation. More consultants will be needed to standardize health records in outpatient clinics, community health centers, nursing homes, and home care programs. The importance of medical records in research and the growing use of computers to store and retrieve medical information also should increase the demand for qualified medical record administrators to develop new medical information systems. Part-time employment opportunities also should be available in teaching, in research, and in consulting work for health care facilities.

Earnings and Working Conditions

The salaries of medical record administrators are influenced by the location, size, and type of employing institution, as well as by the duties and responsibilities of the position. The average starting salary for medical record administrators in 1974 was $10,368 a year, according to a national survey conducted by the University of Texas Medical Branch at Galveston. Top salaries averaged $12,840 a year, with some earning as much as $18,792.

Newly graduated medical record administrators employed by the Federal Government generally started at $8,500 a year in late 1974; those having bachelor's degrees and good academic records were eligible to begin at $10,520. Some experienced medical record administrators employed by the Federal Government earned as much as $23,998 annually.

Medical record administrators usually work a regular 36- to 40-hour week and receive paid holidays and vacations.

Sources of Additional Information

Information about approved schools and employment opportunities is available from:

The American Medical Record Association, 875 N. Michigan Ave., Suite 1850, John Hancock Center, Chicago, Ill. 60611.

OCCUPATIONAL THERAPISTS

(D.O.T. 079.128)

Nature of the Work

Occupational therapists plan and direct educational, vocational, and recreational activities designed to help mentally and physically disabled patients become self-sufficient. They evaluate the capacities and skills of clients, set goals, and plan a therapy program together with the client and members of a medical team which may include physicians, physical therapists, vocational counselors, nurses, social workers, and other specialists.

About 2 therapists out of 5 works with emotionally handicapped patients, and the rest work with physically disabled persons. These clients represent all age groups and degrees of illness. Patients participate in occupational therapy to determine the extent of abilities and limitations; to regain physical, mental, or emotional stability; to relearn daily routines such as eating, dressing, writing, and using a telephone; and eventually, to prepare for employment.

Occupational therapists teach manual and creative skills such as weaving and leather working, and business and industrial skills such as typing and the use of power tools. They also plan and direct activities, especially for children. Therapists may design and make special equipment or splints to help disabled patients.

Besides working with patients, occupational therapists supervise student therapists, occupational therapy assistants, volunteers, and auxiliary nursing workers. The chief occupational therapist in hospitals may teach medical and nursing students the principles of occupational therapy. Many therapists administer occupational therapy programs, coordinate patient activities, or are consultants to local and State health departments and mental health agencies. Some teach in colleges and universities.

Places of Employment

About 9,400 people, more than 9 out of 10 of them women, worked as occupational therapists in 1974. Almost half of all occupational therapists work in hospitals. Rehabilitation centers, nursing homes, schools, outpatient clinics, community mental health centers, and research centers employ most of the others. Some work in special sanitariums or camps for handicapped children, others in State health departments. Still others work in home-care programs for patients unable to attend clinics or workshops. Some are members of the Armed Forces.

Training, Other Qualifications, and Advancement

A degree or certification in occupational therapy is required to enter the profession. In 1974, 40 colleges and universities offered programs in occupational therapy which were accredited by the American Medical Association and the American Occupational Therapy Association. All of these schools offer bachelor's degree programs. Some schools have 2-year programs and accept students who have completed 2 years of college. Some also offer shorter programs, leading to a certificate or a master's degree in occupational therapy for students who have a bachelor's degree in another field. A graduate degree often is required for teaching, research, or administrative work.

Course work in occupational therapy programs includes physical, biological, and behavioral sciences and the application of occupational therapy theory and skills. Students also work in hospitals or health agencies to gain clinical experience. After students complete the 6- to 9-month clinical practice period and graduate from their programs, they are eligible for the American Occupational Therapy Association examination to become registered occupational therapists (O.T.R.). Occupational therapy assistants who are certified by the association and have 4 years of approved work experience also are eligible to take the examination to become registered occupational therapists.

Personal qualifications needed in this profession include a sympathetic but objective approach to illness and disability. Occupational therapists also need maturity, patience, imagination, manual skills, and the ability to teach. High school students interested in careers as occupational therapists are advised to take courses in health, biology, crafts, and the social sciences.

Newly graduated occupational therapists generally begin as staff therapists. After several years on the job, they may qualify as senior therapists or specialized practitioners. Some advance to supervisory or administrative jobs in occupational therapy programs; others teach or do research.

Employment Outlook

Employment opportunities for occupational therapists are expected to be favorable through the mid-1980's. The increasing number of graduates is expected to be roughly in balance with new openings that are expected to result from growth of the occupation and replacement for those who will die, retire, or leave the field for other reasons.

Employment in this occupation is expected to grow faster than the average for all occupations due to public interest in the rehabilitation of disabled persons and the success of established occupational therapy programs. Many therapists will be needed to staff hospital rehabilitation departments, community health centers, extended care facilities, psychiatric centers, schools for children with developmental and learning disabilities, and community home health programs.

Earnings and Working Conditions

Beginning salaries for new graduates of occupational therapy programs averaged about $9,500 a year in 1974, according to a national survey conducted by the University of Texas Medical School. Experienced occupational therapists earned an average salary of about $12,500 a year; some earned as much as $14,800, and some administrators as high as $25,000 to $30,000. In 1974, the average salary of experienced occupational therapists was one and a half times the average earnings for all nonsupervisory workers in private industry, except farming.

In late 1974, beginning therapists employed by the Veterans Administration earned starting salaries of $9,473 a year. Most experienced, nonsupervisory occupational therapists earned about $12,850 annually.

Many part-time positions are available for occupational therapists. Some organizations require evening work.

Sources of Additional Information

For more information on occupational therapy as a career, write to:

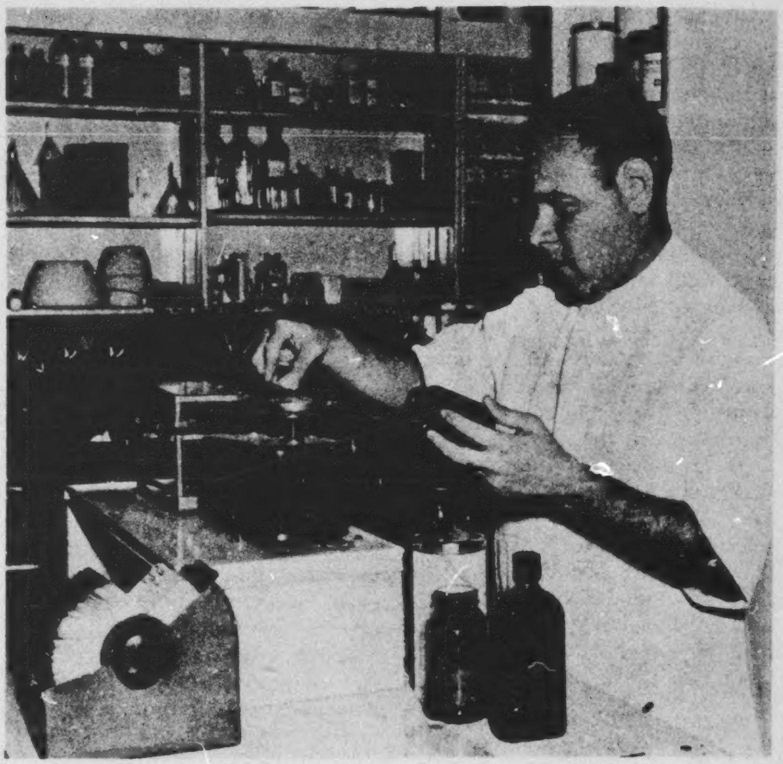
American Occupational Therapy Association, 6000 Executive Blvd., Rockville, Md. 20852.

PHARMACISTS

(D.O.T. 074.181)

Nature of the Work

Pharmacists dispense drugs and medicines prescribed by medical practitioners and supply and advise people on the use of many medicines that can be obtained with and without prescriptions. Pharmacists must understand the use, composition, and effect of drugs and be able to test them for purity and strength. They also advise physicians on the proper selection and use of medicines. Compounding—the actual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is now only a small part of pharmacists' practice, since most medicines are produced by manufacturers in the form used by the patient.



Many pharmacists employed in community pharmacies also have other duties. Besides dispensing medicines, some pharmacists buy and sell nonpharmaceutical merchandise, hire and supervise personnel, and oversee the general operation of the pharmacy. Other pharmacists, however, operate prescription pharmacies that dispense only medicines, medical supplies, and health accessories.

Pharmacists in hospitals and clinics dispense prescriptions and advise the medical staff on the selection and effects of drugs; they also make sterile solutions, buy medical supplies, teach in schools of nursing and allied health professions, and perform administrative duties. An increasing number of hospital pharmacists work as consultants to the medical team in matters related to daily patient care.

Some pharmacists, employed as medical sales representatives by drug manufacturers and wholesalers, sell medicines to retail pharmacies and to hospitals, and inform health personnel about new drugs. Others teach in pharmacy colleges, supervise the manufacture of pharmaceuticals, or develop new medicines. Some pharmacists also edit or write articles for pharmaceutical journals, or do administrative work.

Places of Employment

About 117,000 persons worked

as licensed pharmacists in 1974; more than 10 percent were women. About 96,000 pharmacists worked in community pharmacies. Of these community pharmacists, more than two-fifths owned their own pharmacies; the others were salaried employees. Most of the remaining salaried pharmacists worked for hospitals, pharmaceutical manufacturers, and wholesalers. Some were civilian employees of the Federal Government, working chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. Others served as pharmacists in the Armed Forces, taught in colleges of pharmacy, or worked for State and local government agencies.

Most towns have at least one pharmacy with one pharmacist or more in attendance. Most pharmacists, however, practice in or near cities, and in those States which have the largest populations.

Training, Other Qualifications, and Advancement

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must be a graduate of an accredited pharmacy college, pass a State board examination and—in nearly all States—have a specified amount of practical experience or internship under the supervision of a registered pharmacist. All States except California, Florida, and Hawaii grant a license without examination to qualified pharmacists already licensed by another State.

At least 5 years of study beyond high school are required to graduate from one of the 73 accredited colleges of pharmacy and receive a Bachelor of Science (B.S.) or a Bachelor of Pharmacy (B. Pharm.) degree. A few colleges that require 6 years award a Doctor of Pharmacy (Pharm. D.) degree at the completion of the program. A few colleges admit students directly from high school and offer all the education necessary for graduation. Most colleges provide 3 or 4 years of professional instruction and require all entrants to have completed their prepharmacy education in an accredited junior college, college, or university.

A prepharmacy curriculum usually emphasizes mathematics and basic sciences, such as chemistry and biology, but also includes courses in the humanities and social sciences. Because entry requirements vary among colleges of pharmacy, prepharmacy students should inquire about and follow the curriculum required by colleges they plan to attend.

The bachelor's degree in pharmacy is the minimum educational qualification for most positions in the profession. However, a master's or doctor's degree in pharmacy or a related field usually is required for research work or college teaching. Areas of special study include pharmaceutics, pharmaceutical chemistry, pharmacology (study of the effects of drugs on the body), pharmacognosy (study of the drugs derived from plant or animal sources), clinical pharmacy, and pharmacy administration.

A limited number of Federal loans are available for students studying full-time toward a degree in pharmacy. Several scholarships also are awarded annually by drug manufacturers, chain drugstores, corporations, State and national pharmacy associations, and the colleges of pharmacy.

Since many pharmacists are self-employed, prospective pharmacists should have some business ability, as well as an interest in medical science and the ability to gain the confidence of customers. Honesty, integrity, and orderliness are important attributes for the profession. In addition, accuracy is needed to compound and dispense medicines as well as keep records required by law.

Pharmacists often begin as employees in community pharmacies. After they gain experience and obtain the necessary funds they may become owners or part-owners of pharmacies. A pharmacist who gains experience in a chain drugstore may advance to a managerial position, and later to a higher executive position within the company. Hospital pharmacists who have the necessary training and experience may advance to director of pharmacy service or to other administrative positions.

Employment Outlook

The employment outlook for pharmacists is expected to be very good through the mid-1980's. Growth of the occupation is expected to be about as fast as the average for all occupations. Most openings, however, will result from the death and retirement of persons already in the profession. Overall, job openings are expected to exceed the number of graduates of pharmacy schools.

Employment in the occupation will grow as new pharmacies are established, particularly in residential areas or suburban shopping centers. Many community pharmacies, also, are expected to hire additional pharmacists, because of a trend towards shorter working hours. Population growth, the rising standard of medical care, and the growth of Medicaid and other insurance programs that provide payment for prescription drugs also will generate demand for pharmacists.

Employment in hospitals probably will rise with the more extensive use of pharmacists for hospital and clinic work. Continued expansion in the manufacture of pharmaceutical products and in research are expected to provide more opportunities for pharmacists in production, research, distribution, and sales. Pharmacists with advanced training will be needed for college teaching and laboratory research.

Earnings and Working Conditions

Earnings of pharmacists employed in chain drugstores averaged about $17,000 in 1974, according to a survey conducted by the National Association of Chain Drug Stores. Pharmacists who are owners or managers of pharmacies often earn more. The minimum entrance salary in the Federal Government for new graduates was about $12,800 a year, in late 1974. With a master's degree or 2 years of graduate studies, the beginning salary was about $15,500. The average salary for all federally employed pharmacists was $18,061.

Annual starting salaries for hospital pharmacists were about $13,150 in 1974, according to a survey conducted by the University of Texas Medical School. Top salaries for experienced hospital pharmacists averaged $15,700, and some were as high as $22,900.

Community pharmacists generally work more than the standard 40-hour workweek. Pharmacies often are open in the evenings and on weekends, and all States require a registered pharmacist to be in attendance during store hours. Despite the general trend toward shorter hours, 44 hours is still the basic workweek for many salaried pharmacists, and some work 50 hours or more. Self-employed pharmacists often work more hours than those in salaried positions. Those who teach or work for industry, government agencies, or hospitals have shorter workweeks.

Sources of Additional Information

A free packet giving information on pharmacy as a career, preprofessional requirements, and student financial aid is available from:

American Association of Colleges of Pharmacy, Office of Student Affairs, 4630 Montgomery Ave., Suite 201, Bethesda, Md. 20014.

General information on pharmacy is available from:

American Pharmaceutical Association, 2215 Constitution Ave. NW., Washington, D.C. 20037.

Information about chain drugstores is available from:

National Association of Chain Drug Stores, 1911 Jefferson Highway, Arlington, Va. 22202.

For information about retail pharmacies, contact:

American Council on Pharmaceutical Education, 77 W. Washington St., Chicago, Ill. 60602.

Information on requirements for licensure in a particular State is available from the Board of Pharmacy of that State or from:

National Association of Boards of Pharmacy, 77 W. Washington St., Chicago, Ill. 60602.

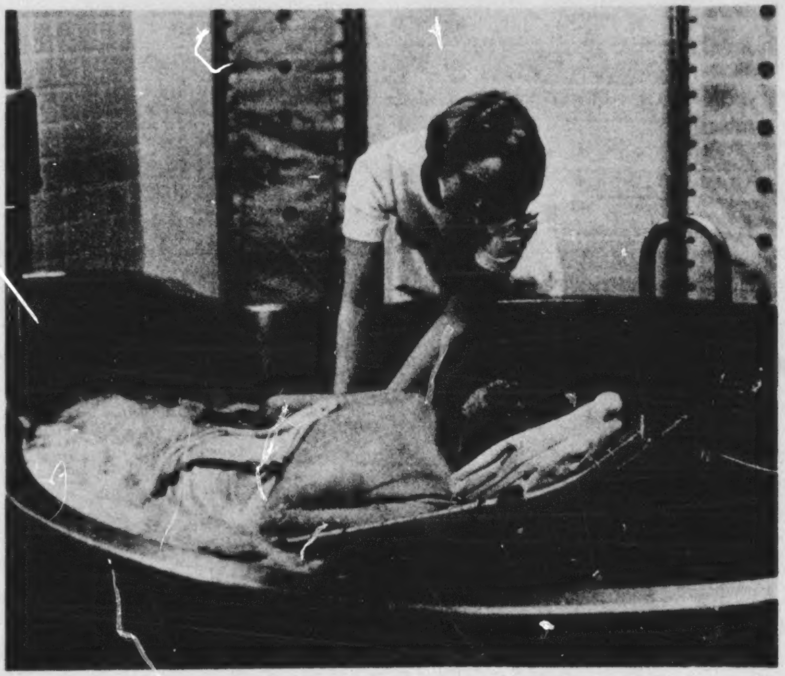
Information on college entrance requirements, curriculums, and financial aid is available from the dean of any college of pharmacy.

PHYSICAL THERAPISTS

(D.O.T. 079.378)

Nature of the Work

Physical therapists help persons with muscle, nerve, joint, and bone diseases or injuries to overcome their disabilities. Their patients include accident victims, crippled children, and disabled older persons. Physical therapists perform and interpret tests and measurements for muscle strength, motor development, functional capacity, and respiratory and circulatory efficiency to develop programs for treatment. They evaluate the effectiveness of the treatment and discuss the patients' progress with physicians, psychologists, occupational therapists, and other specialists. When advisable, physical therapists revise the therapeutic procedures and treatments. They help disabled persons to accept their physical handicaps and adjust to them. They show members of the



patients' families how to continue treatments at home.

Therapeutic procedures include exercises for increasing strength, endurance, coordination, and range of motion; stimuli to make motor activity and learning easier; instruction in carrying out everyday activities and in the use of helping devices; and the application of massage, heat and cold, light, water, or electricity to relieve pain or improve the condition of muscles.

Most physical therapists provide direct care to patients as staff members, supervisors, or self-employed practitioners. These therapists may treat many categories of patients or may specialize in pediatrics, geriatrics, amputations, arthritis, or paralysis. Others administer physical therapy programs, teach, or are consultants.

Places of Employment

About 20,000 persons—3 out of 4 of them women—worked as licensed physical therapists in 1974. About three-fourths of all physical therapists work in hospitals or nursing homes; others, in rehabilitation centers or schools for crippled children. Some who work for public health agencies treat chronically sick patients in their own homes. Still others work in physicians' offices or clinics, teach in schools of physical therapy, or work for research organizations. A few serve as consultants in government and voluntary agencies or are members of the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license to practice physical therapy. Applicants for a license must have a degree or certificate from a school of physical therapy and to qualify must pass a State board examination. In 1974, there were 66 schools of physical therapy which had been approved by the American Medical Association and the American Physical Therapy Association.

Most of the approved schools of physical therapy offer bachelor's degree programs. A number of schools accept those who already have a bachelor's degree and give a 12- to 16-month course leading to a certificate in physical therapy. Some schools offer both a bachelor's degree and a certificate program.

The physical therapy curriculum includes science courses such as anatomy, physiology, neuroanatomy, and neurophysiology; also specialized courses such as biomechanics of motion, human growth and development, and manifestations of disease and trauma. Besides receiving classroom instruction, students get supervised practical experience administering physical therapy to patients in a hospital or treatment center.

Several universities offer the master's degree in physical therapy. A graduate degree, combined with clinical experience, increases the opportunities for advancement, especially to teaching, research, and administrative positions.

Therapists must have patience, tact, resourcefulness, and emotional stability in order to help patients and their families understand the treatments and adjust to their handicaps. Physical therapists also should have manual dexterity and physical stamina. Many persons who want to determine whether they have the personal qualities needed for this occupation volunteer for summer or part-time work in the physical therapy department of a hospital or clinic. High school courses that are useful include health, biology, social science, mathematics, and physical education.

Employment Outlook

Employment opportunities for physical therapists are expected to be favorable through the mid-1980's. The rapidly growing number of new graduates is expected to be in rough balance with the average number of openings that will result each year from growth in the occupation and from replacement of those who will die or retire. Employment opportunities will be best in suburban and rural areas.

Employment of physical therapists is expected to grow much faster than the average for all occupations through the mid-1980's because of increased public recognition of the importance of rehabilitation. As programs to aid crippled children and other rehabilitation activities expand, and as growth takes place in nursing homes and other facilities for the elderly, many new positions for physical therapists are likely to be created. Many part-time positions should continue to be available.

Earnings and Working Conditions

Starting salaries for new physical therapy graduates averaged about $9,600 a year in 1974, according to a national survey conducted by the University of Texas Medical School at Galveston. Earnings of experienced physical therapists averaged $11,500; some earned as much as $16,000.

Beginning therapists employed by the Veterans Administration (VA) earned starting salaries of $9,473 a year in late 1974. Most experienced nonsupervisory physical therapists in the VA earned $12,841 annually; those who were supervisors, about $18,463.

Sources of Additional Information

Additional information and locations of institutions offering approved programs in physical therapy are available from:

American Physical Therapy Association,
1156 15th St. NW., Washington, D.C. 20036.

REGISTERED NURSES

(D.O.T. 075.118 through .378)

Nature of the Work

Nursing plays a major role in health care. As important members of the medical care team, registered nurses perform a wide variety of functions. They observe, evaluate, and record symptoms, reactions, and progress of patients; administer medications; assist in the rehabilitation of patients; and help maintain a physical and emotional environment that promotes recovery.

Some registered nurses provide hospital care. Others perform research activities or instruct students. The setting usually determines the scope of the nurse's responsibilities.

Hospital nurses constitute the largest group of nurses. Most are staff nurses who provide skilled bedside nursing care and carry out the medical treatment plans prescribed by physicians. They may also supervise practical nurses, aides, and orderlies. Hospital nurses usually work with groups of patients that require similar nursing care. For instance, some nurses work with patients who have had surgery; others care for children, the elderly, or the mentally ill. Some are administrators of nursing services.

Private duty nurses give individual care to patients who need constant attention. The private duty nurse may sometimes care for several hospital patients who require special care, but not full-time attention.

Office nurses assist physicians, dental surgeons, and occasionally dentists in private practice or clinics. Sometimes they perform routine laboratory and office work in addition to their nursing duties.

Public health nurses care for patients in clinics, homes, schools, and other community settings. They instruct patients and families in proper care and give periodic care as prescribed by a physician. They may also instruct groups of patients in proper diet and arrange for immunizations. These nurses work with community leaders, teachers, parents, and physicians in community health education. Some public health nurses work in schools.

Nurse educators teach students the principles and skills of nursing, both in the classroom and in direct patient care. They also conduct continuing education courses for registered nurses, practical nurses, and nursing assistants.

Occupational health or industrial nurses provide nursing care to employees in industry and government and, along with physicians promote employee health. As prescribed by a doctor, they treat minor injuries and illnesses occurring at the place of employment, provide for the needed nursing care, arrange for further medical care if necessary, and offer health counseling. They also may assist with health examinations and inoculations.

Places of Employment

Nearly 860,000 persons—all but 1 percent of them women—worked as registered nurses in 1974. About one-third worked on a part-time basis.

About three-quarters of all registered nurses worked in hospitals, nursing homes, and related institutions. About 50,000 were office nurses and about 40,000 were private duty nurses who cared for patients in hospitals and private homes. Public health nurses in government agencies, schools, visiting nurse associations, and clinics numbered about 55,000; nurse educators in nursing schools accounted for about 30,000; and occupational health nurses in industry, about 20,000. Most of the others were staff members of professional nurse and other organizations, State boards of nursing, or working for research organizations.

Training, Other Qualifications, and Advancement

A license is required to practice professional nursing in all States and in the District of Columbia. To obtain a license, a nurse must be a graduate of a school approved by the State board of nursing and pass the State board examination. Nurses may be licensed in more than one State, either by examination or endorsement of a license issued by another State.

Three types of educational programs—diploma, baccalaureate, and associate degree—offer the education required for basic careers in registered nursing. All three programs prepare candidates for licensure; however, the baccalaureate program is preferred for those who aspire to administrative or management positions, and those planning to work in research, consultation, teaching, or clinical specialization, which require education at the master's level. Graduation from high school is required for admission to all schools of nursing.

Diploma programs are conducted by hospital and independent schools and usually require 3 years of training. Bachelor's degree programs usually require 4 years of study in a college or university, although a few require 5 years. Associate degree programs in junior and community colleges require approximately 2 years of nursing education. In addition, several programs provide licensed practical nurses with the training necessary to upgrade themselves to registered nurses while they continue to work part time. These programs generally offer an associate of arts degree. In early 1974, about 1,430 programs (associate, diploma, and baccalaureate) were offered in the United States. In addition, there were 94 master's and doctoral degree programs in nursing.

Programs of nursing include classroom instruction and supervised nursing practice in hospitals and health facilities. Students take courses in anatomy, physiology, microbiology, nutrition, psychology, and nursing. They also get supervised clinical experience in the care of patients who have different types of health problems. Students in bachelor's degree programs as well as in some of the other programs are assigned to community agencies to learn how to care for patients in clinics and in the patients' homes. General education is combined with nursing education in baccalaureate and associate degree programs and in some diploma programs.

Qualified students who need financial aid may be able to get a federally sponsored nursing scholarship or a low-interest loan.

Young persons who want to pursue a nursing career should have a sincere desire to serve humanity and be sympathetic to the needs of others. Nurses must be able to follow orders precisely and to use good judgment in emergencies; they also should be able to accept responsibility and direct or supervise the activity of others. Good mental health is needed in order to cope with human suffering and frequent emergency situations. Staff nurses need physical stamina because of the amount of time spent walking and standing.

From staff positions in hospitals, experienced nurses may advance to head nurse, assistant director, and director of nursing services. A master's degree, however, often is required for supervisory and administrative positions, as well as for positions in nursing education, clinical specialization, and research. In public health agencies, advancement is usually difficult for nurses who do not have degrees in public health nursing.

A growing movement in nursing, generally referred to as the "nurse practitioner program" is opening new career possibilities. Nurses who wish to take the extra training are preparing for highly independent roles in the clinical care and teaching of patients. They are practicing in primary roles which include pediatrics, geriatrics, community health, mental health, and medical-surgical nursing.

Employment Outlook

Employment opportunities for registered nurses are expected to be favorable through the mid-1980's. However,if trends in the number of persons enrolling in schools of nursing continue, some competition for more desirable, higher paying jobs may develop during the latter part of this period. Opportunities for full- or part-time work in present shortage areas such as some southern States and many inner-city locations are expected to be very favorable through 1985. For nurses who have had graduate education, the outlook is excellent for obtaining positions as administrators, teachers, clinical specialists, and public health nurses.

Growth in employment of registered nurses is expected to be much faster than the average for all occupations because of extension of prepayment programs for hospitalization and medical care, expansion of medical services as a result of new medical techniques and drugs, and increased interest in preventive medicine and rehabilitation of the handicapped. In addition to the need to fill new positions, large numbers of nurses will be required to replace those who leave the field each year.

Earnings and Working Conditions

Registered nurses who worked in hospitals in 1974 received average starting salaries of $9,100 a year, according to a national survey conducted by the University of Texas Medical Branch. This was above the average for nonsupervisory workers in private industry, except farming. Registered nurses in nursing homes can expect to earn slightly less than those in hospitals. Salaries of industrial nurses averaged $192 a week in early 1974, according to a survey conducted by the Bureau of Labor Statistics.

In early 1975, the Veterans Administration paid inexperienced nurses who had a diploma or an associate degree starting salaries of $9,473 a year; those with baccalaureate degrees, $11,070. Nurses employed in all Federal Government agencies earned an average of $14,700 in 1974.

Most hospital and nursing home nurses receive extra pay for work on evening or night shifts. Nearly all receive from 5 to 13 paid holidays a year, at least 2 weeks of paid vacation after 1 year of service, and also some type of health and retirement benefits.

Sources of Additional Information

For information on approved schools of nursing, nursing careers, loans, scholarships, salaries, working conditions, and employment opportunities, contact:

ANA Committee on Nursing Careers, American Nurses' Association, 2420 Pershing Rd., Kansas City, Mo. 64108.

Information about employment opportunities in the Veterans Administration is available from:

Department of Medicine and Surgery, Veterans Administration, Washington, D.C. 20420.

RESPIRATORY THERAPY WORKERS

(D.O.T. 079.368)

Nature of the Work

Respiratory therapy workers, sometimes called inhalation therapy workers, treat patients with cardiorespiratory problems. This treatment may range from giving temporary relief to patients with chronic asthma or emphysema to giving emergency care in cases of heart failure, stroke, drowning, and shock. Respiratory therapy workers also are among the first medical specialists called for emergency treatment of acute respiratory conditions arising from head injury or drug poisoning. Since a patient can safely cease to breathe for only a short span of time, the therapy worker has a highly responsible role. If breathing has stopped for longer than 3 to 5 minutes, there is little chance that the patient can recover without brain damage, and if oxygen is unavailable for more than 9 minutes, death results.

Respiratory therapy workers follow doctors' orders and use special equipment such as respirators and positive-pressure breathing machines to administer gas therapy, aerosol therapy, and other treatments involving respiration. They also show patients and their families how to use the equipment at home. Other duties include keeping records of the cost of materials and charges to patients, and maintaining and making minor repairs to equipment.

There are three levels of workers within the field of respiratory therapy: therapists, technicians, and assistants. Therapists and technicians perform essentially the same duties. However, the therapist is expected to have a higher level of expertise and may be expected to assume some teaching and supervisory duties. Respiratory therapy assistants have little contact with patients and spend most of their

time taking care of the equipment. Many are new to the job and are training to advance to the technician or therapist level.

Places of Employment

About 38,000 persons worked as respiratory therapists, technicians, or assistants in 1974—about one-half were women.

Most work in hospitals, in respiratory therapy, anesthesiology, or pulmonary medicine departments. Others work for oxygen equipment rental companies, ambulance services, nursing homes, and universities.

Training, Other Qualifications, and Advancement

Respiratory apparatus has become increasingly complex in recent years and, although a few respiratory therapy workers are trained on the job, formal training is now stressed as the requisite for entry to the field.

In 1974, about 125 institutions offered educational programs in respiratory therapy approved by the Council on Medical Education of the American Medical Association. High school graduation is required for entry. Courses vary in length between 18 months and 4 years and include both theory and clinical work. A bachelor's degree is awarded for completion of a 4-year program and lesser degrees are awarded for shorter courses. Areas of study include human anatomy and physiology, chemistry, physics, microbiology, and mathematics. Technical courses offered deal with procedures, equipment, and clinical tests.

Respiratory therapists who have a certificate of graduation from an AMA-approved therapist training program, 62 semester hours of college credit, and 1 year of experience following completion of the program are eligible to apply for registration by the National Board for Respiratory Therapy (NBRT). The registry examination consists of two tests, a written and an oral. Applicants must pass both to be awarded the American Registered Respiratory Therapist (ARRT) credential. In 1974, about 2,500 therapists had been registered. A registered respiratory therapist often can advance faster and obtain a more responsible position than one who is not registered. An increasing number of employers recognize registration as an acknowledgment of a therapist's professional competence.

Individuals who complete an AMA-approved technician training program and have 1 year of experience in respiratory therapy may apply to the NBRT for examination for the Certified Respiratory Therapy Technician (CRTT) credential. The CRTT examination is less comprehensive than the registry examination and consists of a single written test. Approximately 8,000 respiratory therapy technicians had been certified in 1974.

In contrast to therapists and technicians, there are no general requirements for the position of respiratory therapy assistant. The only requirements are those set by the head of the hospital department that is hiring workers. For example, some require a high school diploma.

Respiratory therapists can advance to positions as assistant chief, chief therapist, or, with graduate education, instructor of respiratory therapy at the college level. Respiratory therapy technicians and assistants can advance to the therapist level by taking the appropriate training courses.

People who want to enter the respiratory therapy field should enjoy working with patients and should understand their physical and psychological needs. Respiratory therapy workers must be able to pay attention to detail, follow instructions, and work as part of a team., Operating the complicated respiratory therapy equipment also requires mechanical ability and manual dexterity. High school students interested in a career in this field are encouraged to take courses in health, biology, mathematics, physics, and bookkeeping.

Employment Outlook

Employment opportunities for respiratory therapy workers are expected to be good through the mid-1980's. Those with advanced training in respiratory therapy will be in demand to fill teaching and supervisory positions.

The employment of respiratory therapy workers is expected to grow much faster than the average for all occupations, owing to new uses for respiratory therapy, increased acceptance of its use, and the growth in health services in general. Many specialists in respiratory therapy will be hired to release nurses and other personnel from respiratory therapy work to return to their primary duties. Many other openings will arise from the need to replace those who retire, die, or leave the occupation for other reasons.

Earnings and Working Conditions

The starting salary of respiratory therapists employed in hospitals and medical centers averaged about $8,064 a year in 1974, according to a survey conducted by the University of Texas Medical Branch. Top salaries of experienced respiratory therapists in hospitals ranged as high as $13,980 a year. Salaries of respiratory therapy technicians and assistants are lower than those of respiratory therapists.

The Federal Government paid respiratory therapists starting salaries of $6,764 a year in late 1974 if they had 1 year of post-secondary training, and $7,596 for those with 2 years of training. Some therapists employed by the Federal Government in late 1974 earned as much as $13,679 a year.

Respiratory therapy workers in hospitals receive the same benefits as other hospital personnel, including hospitalization, paid vacations, and sick leave. Some institutions provide tuition assistance or free courses, pension programs, uniforms, and parking.

Respiratory therapy workers generally have a 40-hour week. After-hours and weekend duty is generally required since most hospitals have 24-hour coverage throughout the week. Adherence to safety precautions and regular testing of equipment minimize the potential hazard of fire to workers and patients.

Sources of Additional Information

Information concerning education programs is available from:

American Association for Respiratory Therapy, 7411 Hines Place, Dallas, Tex. 75235.

Information on the accrediting of respiratory therapists and respiratory therapy technicians can be obtained from:

The National Board for Respiratory Therapy, Inc., 1900 West 47th St., Suite 124, Westwood, Kansas 66205.

On-the-job training information can be obtained at local hospitals.

SPEECH PATHOLOGISTS AND AUDIOLOGISTS

(D.O.T. 079.108)

Nature of the Work

About 1 out of 10 Americans is unable to speak or hear clearly. Children who have trouble speaking or hearing cannot participate fully with other children in play or in normal classroom activities. Adults having speech or hearing impairments often have problems in job adjustment. Speech pathologists and audiologists provide direct services to these people by evaluating their speech or hearing disorders and then providing treatment.

The speech pathologist works with children and adults who have speech, language, and voice disorders resulting from causes such as total or partial hearing loss, brain injury, cleft palate, mental retardation, emotional problems, or foreign dialect. The audiologist primarily assesses and treats hearing problems. Speech and hearing, however, are so interrelated that to be competent in one of these fields, one must be familiar with both.

The duties of speech pathologists and audiologists vary with education experience, and place of employment. In clinics, either in schools or other locations, they use diagnostic procedures to identify and evaluate speech and hearing disorders. Then, in cooperation with physicians, psychologists, physical therapists, and counselors, they develop and implement an organized program of therapy. Some speech pathologists and audiologists conduct research such as investigating the causes of communicative disorders and improving methods for clinical services. Others supervise clinical activities or do other administrative work.

Speech pathologists and audiologists in colleges and universities instruct in the principles of communication, communication disorders, and clinical techniques; participate in educational programs with physicians, nurses, and teachers; and work in university clinics and research centers. Most speech pathologists and audiologists have some administrative responsibilities. However, directors of speech and hearing clinics, and coordinators of speech and hearing in schools, health departments, or government agencies, may be totally involved in administration.

Places of Employment

Over 31,000 persons, three-fourths of them women, worked as speech pathologists and audiologists in 1974. Over one-half worked in public schools. Colleges and universities employed many in classrooms, clinics, and research centers. The rest worked in hospitals, speech and hearing centers, government agencies, industry, and private practice.

Training, Other Qualifications, and Advancement

An increasing number of States require a master's degree or its equivalent for speech pathologists and audiologists. In addition, many Federal programs, such as Medicare and Medicaid, require participating speech pathologists and audiologists to have a master's degree. Some States require a teaching certificate to work in the public schools.

Undergraduate courses in speech pathology and audiology include anatomy, biology, physiology, physics, linguistics, semantics, and phonetics. Courses in speech and hearing as well as in child psychology and psychology of the exceptional child are also helpful. This training is usually available at colleges that offer a broad liberal arts program.

In early 1975, about 225 colleges and universities offered graduate education in speech pathology and audiology. Courses at the graduate level include advanced anatomy and physiology of the areas involved in hearing and speech, acoustics, and psychological aspects of communication. Training also is given in the analysis of speech production, language abilities, and auditory processes. Graduate students gain a familiarity with research methods used to study speech and hearing.

Scholarships, fellowships, assistantships, and traineeships are available in this field. Teaching and training grants to colleges and universities that have programs in

speech and hearing are given by the U.S. Rehabilitation Services Administration, the Maternal and Child Health Service, the U.S. Office of Education, and the National Institutes of Health. In addition, some Federal agencies distribute money to colleges to aid graduate students in speech and hearing programs. A large number of private organizations and foundations also provide financial assistance for education in this field.

Meeting the American Speech and Hearing Association's (ASHA) requirements for a Certificate of Clinical Competence usually is necessary in order to advance professionally and to earn a higher salary. To earn the CCC, a person must have a master's degree or its equivalent and complete a 1-year internship approved by the Association. Passing a national written examination also is required.

Speech pathologists and audiologists should be able to approach problems objectively and have a concern for the needs of others. They sould also have considerable patience, because a client's progress often is slow. A person who desires a career in speech pathology and audiology should be able to accept responsibility, work independently, and direct others. The ability to work with detail is important. Speech pathologists and audiologists receive satisfaction from seeing the results of their work.

Employment Outlook

The employment of speech pathologists and audiologists is expected to increase much faster than the average for all other occupations through the mid-1980's. However, temporary reductions in government spending on speech and hearing programs may decrease the number of new positions available at any one time. Although some jobs will be available for those having only a bachelor's degree, the increasing emphasis placed on the master's degree by State governments, school systems, and Federal agencies will limit opportunities at the bachelor's degree level.

Although employment opportunities for those with a master's degree should generally be favorable, the large number of graduates entering this field may cause some competition. Many openings will occur outside of the large metropolitan areas and some graduates will have to relocate in order to find employment. Competition for teaching positions in colleges and universities will be very strong throughout the period.

Population growth, which will increase the number of persons having speech and hearing problems, is one of the factors underlying the expected expansion in employment of speech pathologists and audiologists through the mid-1980's. In addition, there is a trend toward earlier recognition and treatment of hearing and language problems in children. Many school-age children, thought to have learning disabilities, actually have language or hearing disorders which speech pathologists and audiologists can treat.

Other factors expected to increase demand for speech pathologists and audiologists are expansion in expenditures for medical research and the growing public interest in speech and hearing disorders. These are illustrated by State and Federal laws, which provide for the education of handicapped children, and expanded speech and hearing services available under Federal programs such as Medicare and Medicaid.

Earnings and Working Conditions

Starting salaries for speech

pathologists and audiologists with a master's degree averaged over $10,200 a year in early 1975. Salaries for persons with considerable experience (6-10 years) averaged about $13,300. Those with a doctoral degree earned average salaries of between $17,000 and $25,000, depending on the job setting and geographic region. Salaries tend to be higher in areas having large urban populations. Many speech pathologists and audiologists, particularly those in colleges and universities, supplement their incomes acting as consultants, engaging in research projects, and writing books and articles.

In early 1975, the annual starting salary in the Federal Government for speech pathologists and audiologists with a master's degree was $12,841. Those having a doctoral degree were eligible to start at $15,481.

Many speech pathologists and audiologists work over 40 hours a week. Almost all receive fringe benefits such as paid vacations, sick leave, and retirement programs.

Sources of Additional Information

State departments of education can supply information on certification requirements for those who wish to work in public schools.

A list of college and university programs and a booklet on student financial aid as well as general career information are available from:

American Speech and Hearing Association,
9030 Old Georgetown Rd., Washington,
D.C. 20014.

SOCIAL SCIENTISTS

Social scientists study all aspects of human society—from the origins of man to the latest election returns. However, they generally specialize in one major field of human relationships. Anthropologists study primitive tribes, reconstruct civilizations of the past, and analyze the physical characteristics, cultures and languages of all peoples, past and present. Economists study the allocation of land, labor, and capital. Geographers study the distribution of people throughout the world, types of land and water masses, and natural resources. Historians describe and interpret the people and events of the past and present. Political scientists study the theories, objectives, and organizations of all types of government. Psychologists study the normal and abnormal behavior of individuals and groups in order to understand and explain their actions. Sociologists analyze the behavior and relationships of groups—such as the family, the community, and minorities—to the individual or to society as a whole. Besides these basic social science occupations, a number of closely related fields are covered in separate statements elsewhere in this book. (See statements on Statisticians, and Social Workers.)

The basic social science occupations provided employment for about 135,000 persons in 1974; over 10 percent of them were women. Overlapping among the basic social science fields and the sometimes hazy distinction between these and related fields such as business administration, foreign service work, and high school teaching, make it difficult to determine the exact size of each profession. Economists, however, are the largest social science group, and anthropologists the smallest.

About one-half of all social scientists work in colleges and universities. A large number work for the Federal Government and private industry. The trend in some industries is to hire increasing numbers of social science majors as trainees for administrative and executive positions. Research councils and other nonprofit organizations provide an important source of employment for economists, political scientists, and sociologists.

Overall employment in the social sciences is expected to grow faster than the average for all occupations through the mid-1980's. Economics is expected to be the fastest growing social science field. Teaching in colleges and universities will remain the major area of employment. Employment of social scientists in government, private industry, and nonprofit organizations is expected to rise also. Despite this anticipated growth, the number of persons seeking to enter the social science field is likely to exceed available job openings. The following statements present more detailed information about the prospective outlook in the individual occupations.

ANTHROPOLOGISTS

(D.O.T. 055.088 and 059.088)

Nature of the Work

Anthropologists study man—his origins, physical characteristics, and culture. These areas include a study of the people's traditions, beliefs, customs, languages, material possessions, social relationships, and value systems. Although anthropologists generally specialize in one of these four areas—cultural anthropology, archeology, linguistics, and physical anthropology—they are expected to have a general knowledge of all of them.

Most anthropologists specialize in cultural anthropology, sometimes called ethnology. *Ethnologists* may spend long periods living with tribal groups or in other communities to learn about their ways of life. The ethnologist takes detailed and comprehensive notes that describe the social customs, beliefs, and material possessions of the people. They usually learn the native language in the process. They also make comparative studies of the cultures and societies of various groups. In recent years, investigations have included complex urban societies.

Archeologists excavate places where people of past civilizations lived. They study the remains of homes, tools, clothing, ornaments, and other evidences of human life and activity to reconstruct the inhabitants' history and customs. For example, in a desert in New Mexico, archeologists uncovered an ancient kiva, an Indian religious chamber. In a cave by the Dead Sea, some have found pieces of ancient scrolls 2,000 years old. In the moors of England, other archeologists have continued to study the ancient monument called Stonehenge, a mysterious circle of huge stones. During the past few years, student archeological teams have excavated three large

prehistoric communities along the Illinois River.

Some anthropologists specialize in *linguistics*, the scientific study of the sounds and structures of languages and of the historical relationships among languages. They study the relationship between the language and the behavior of people and assist in reconstructing the prehistory of mankind.

Physical anthropologists studying human evolution compare the physical characteristics of different races or groups of people as influenced by heredity and environment. This work requires extensive training in human anatomy and biology. A knowledge of body structure enables physical anthropologists to work occasionally as consultants on projects such as the design of cockpits for airplanes and spaceships, and the sizing of clothing. They are consulted on criminal cases and on projects to improve the environment. Increasingly, they are employed in medical schools.

Closely related to the four basic subfields is *applied anthropology*, an emerging specialty which uses the findings of other anthropologists in a practical manner. Applied cultural anthropologists may, for example, provide technical guidelines to ease the transition of nonindustrial societies to a more complex level of socioeconomic organization.

Applied linguistic anthropologists may produce technical and practical language information to encourage the advance of literacy in societies with unwritten languages. Another related specialty area is *urban anthropology*, which is the study of urban life, urbanization, rural-urban migration, and the influence of city life.

Most anthropologists teach in colleges and universities. They often combine teaching with research. Some anthropologists specialize in museum work, which generally combines managerial and administrative duties with fieldwork and research on anthropological collections. A few work as consultants or engage in nontechnical writing.

Places of Employment

About 3,800 persons—about one-fifth of them women—worked as anthropologists in 1974. About three-fourths of all anthropologists work in colleges and universities. Several hundred work in private industry and nonprofit organizations. The Federal Government employs a small number, chiefly in museums, national parks, in the Bureau of Indian Affairs, and in technical aid programs. State and local government agencies also employ anthropologists, usually for museum work or health research.

Training, Other Qualifications, and Advancement

Students who want to become anthropologists should obtain the Ph. D. degree. College graduates with bachelor's degrees often get temporary positions and assistantships in graduate departments where they are working for advanced degrees. A master's degree, plus field experience, is sufficient for many beginning professional positions, but promotion to top positions generally is reserved for individuals who have a Ph. D. degree. Many colleges and universities require a Ph. D. degree for permanent teaching appointments.

Mathematics is helpful, since statistical and computer methods are becoming more widely used for research in this field. Undergraduates may begin their field training in archeology by arranging, through their university departments, to accompany expeditions as laborers or to attend field schools established for training. They may later become supervisors in charge of the digging or collection of material and finally may direct a portion of the work of the expedition. Ethnologists and linguists usually do their fieldwork independently. Most anthropologists base their doctoral dissertations on data collected through field research; they are, therefore, experienced fieldworkers by the time they earn the Ph. D. degree.

Nearly 300 colleges and universities have bachelor's degree programs in anthropology; some 130 offer master's degree programs and about 80, doctoral programs. The choice of a graduate school is very important. Students interested in museum work should select a school which is associated with a museum that has anthropological collections. Similarly, those interested in archeology should choose either a university that offers opportunities for summer experience in archeological fieldwork, or attend an archeological field school elsewhere during summer vacations.

Anthropologists should have special interest in natural history and social studies and enjoy reading, research, and writing. Traveling to remote areas and working under difficulties are sometimes necessary for success.

Anthropologists work with ideas and have the opportunity for self-expression. They should be able to work independently and with detail.

Employment Outlook

The majority of new jobs are expected to be in private industry and in mental and public health and urban planning. College and university teaching, which will remain the largest area of employment for anthropologists, is likely to have little growth.

The number of qualified anthropologists seeking to enter the field will likely exceed available positions. As a result, doctorate holders may face keen competition through the mid-1980's, particularly for jobs in colleges and universities. Graduates with only bachelor's and master's degrees are expected to face very keen competition. Some teaching positions may be available in junior colleges or some high schools for those who meet state certification requirements. In addition, the government and other organizations may hire personnel with social science training as a general background.

Earnings and Working Conditions

Starting salaries for anthropologists with a Ph. D. degree were generally about $13,000 a year in 1974. Experienced anthropologists earned median salaries of $17,500 a year, according to limited data available. They may, however, earn well over $20,000 a year. In general, salaries of experienced anthropologists are higher than the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, anthropologists having a bachelor's degree could begin as trainees at $8,500 or $10,520 a year in 1974, depending upon the applicant's academic record. Starting salaries for those having a master's degree were $12,841 a year, and for those having a Ph. D., $15,481. Anthropologists in the Federal Government averaged around $25,400 in late 1974.

Many anthropologists in colleges and universities supplement their regular salaries with earnings from other sources such as summer teaching and research grants.

Anthropologists sometimes are required to do fieldwork under adverse weather conditions. They also must adapt themselves to cultural environments which are materially and socially different.

Sources of Additional Information

For information about employment opportunities and schools that offer graduate training in anthropology, contact:

The American Anthropological Association,
1703 New Hampshire Ave. NW.,
Washington, D.C. 20009.

The Archeological Institute of America, 260
W. Broadway, New York, N.Y. 10013.

ECONOMISTS

(D.O.T. 050.088 and .118)

Nature of the Work

Economists are concerned with how to utilize scarce resources such as land, raw materials, and human resources to provide goods and services for society. Economists analyze the relationship between the supply of goods and services on the one hand, and demand for them on the other, and how goods and services are produced, distributed, and consumed. Some economists are concerned with specific fields such as farm, wage, tax, and tariff problems and policies. Others develop theories to explain the causes of employment and unemployment or inflation. Most economists analyze and interpret a wide variety of economic data in the course of their work.

Economists who work in colleges and universities teach the theories, principles, and methods of economics and conduct or direct research. They frequently write, and act as consultants.

Economists in government collect and analyze data and prepare studies used to assess economic conditions and the need for changes in government policy. Most government economists are in the fields of agriculture, business, finance, labor, or international trade and development.

Economists who work for business firms provide management with information to make decisions on marketing and pricing of company products; the effect of government policies on business or international trade; or the advisability of adding new lines of merchandise, opening new branch operations, or otherwise expanding the company's business.

Places of Employment

Economics is the largest social science field. More than 71,000 persons, about 10 percent of them women, worked as economists in 1974. Private industry and business employ nearly three-fourths; colleges and universities about one-fifth. Others work for government agencies—mainly Federal—or for private research organizations. Some are self-employed.

Economists work in all large cities and university towns. The largest number are in the New York City and the Washington, D.C. metropolitan areas. Some work overseas, mainly for the U.S. Department of State including the Agency for International Development.

Training, Other Qualifications, and Advancement

Economists must have a thorough understanding of economic theory and of mathematical methods of economic analysis. Since many beginning jobs for economists in government and business involve the collection and compilation of data, a thorough knowledge of basic statistical procedures is required. In addition to courses in macroeconomics, microeconomics, econometrics, and statistics, training in computer science also is highly recommended.

Although a bachelor's degree with a major in economics is sufficient for many beginning research jobs, graduate training often is required for advancement to more responsible positions. In 1974, about one-half of those working as economists held either a master's or a Ph. D. degree. Students interested in graduate training in economics should select schools that provide good research facilities.

In the Federal Government, candidates for entrance positions must have a minimum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus.

A master's degree generally is required to get a job as a college instructor in many junior colleges and small 4-year schools. In many large colleges and universities, completion of all the requirements for a Ph. D. degree, except the dissertation, is necessary for appointment as a teaching assistant. In government or private industry, economists who have a master's degree usually can qualify for more responsible research positions.

The Ph. D. degree is required for a professorship in a highranking college or university and is an asset when competing for other responsible positions in government, business, or private research organizations.

About 750 colleges and universities offer bachelor's degree programs in economics; 200, master's; and over 100, doctoral programs.

Persons who consider careers as economists should be able to work accurately and in detail since much time is spent on research. Frequently, the ability to work as part of a team is required. Economists must be objective in their work and be able to express themselves effectively orally and in writing.

Employment Outlook

The number of persons who will graduate with bachelor's degrees in economics through the mid-1980's is likely to exceed available positions. Although many of these degree holders may find employment in government, industry, and business as trainees or management interns, competition may be keen. Candidates who hold graduate degrees also may face strong competition for positions in colleges and universities, although they should find good opportunities in private industry and government. Economists with training in computer applications should be in particular demand as well as Ph. D.'s working on tax, pollution, and government policy problems of business and industry.

Private industry and business will continue to provide the largest number of employment opportunities for economists because of increased reliance on quantitative methods of analyzing business trends, forecasting sales, and planning purchases and production operations. The next largest area of employment opportunities for economists will be in colleges and universities, although a projected decrease in enrollments is likely to affect growth in faculty size. Employment of economists in State and local government agencies is expected to increase rapidly because of the growing responsibilities of local governments in areas such as housing, mass transportation, and manpower development and training. Employment of economists in the Federal Government is expected to rise slowly—in line with the rate of growth projected for the Federal work force as a whole.

Earnings

Starting salaries for economists with a Ph. D. were about $13,000 a year in 1974, according to limited information. Salaries of economists employed by colleges and universities in 1974 averaged about $22,000, and for those in business, industry, and nonprofit organizations, about $24,000. Economists who have a Ph. D. are paid higher salaries than those who have lesser degrees and similar experience. A substantial number of economists supplement their basic salaries by consulting, teaching, and other research activities. In general, salaries of experienced economists are much higher than the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for beginning economists having a bachelor's degree was $8,500 a year in 1974; however, those with superior academic records could begin at $10,520. Those having a master's degree could qualify for positions at an annual salary of $12,841, while those with a Ph. D. could begin at $15,481. Economists in the Federal Government averaged around $24,700 in late 1974.

Sources of Additional Information

Additional information on a career as an economist is available from:

American Economic Association, 1313 21st Avenue South, Nashville, Tenn. 37212.

GEOGRAPHERS

(D.O.T. 017.281, 029.088, and 059.088)

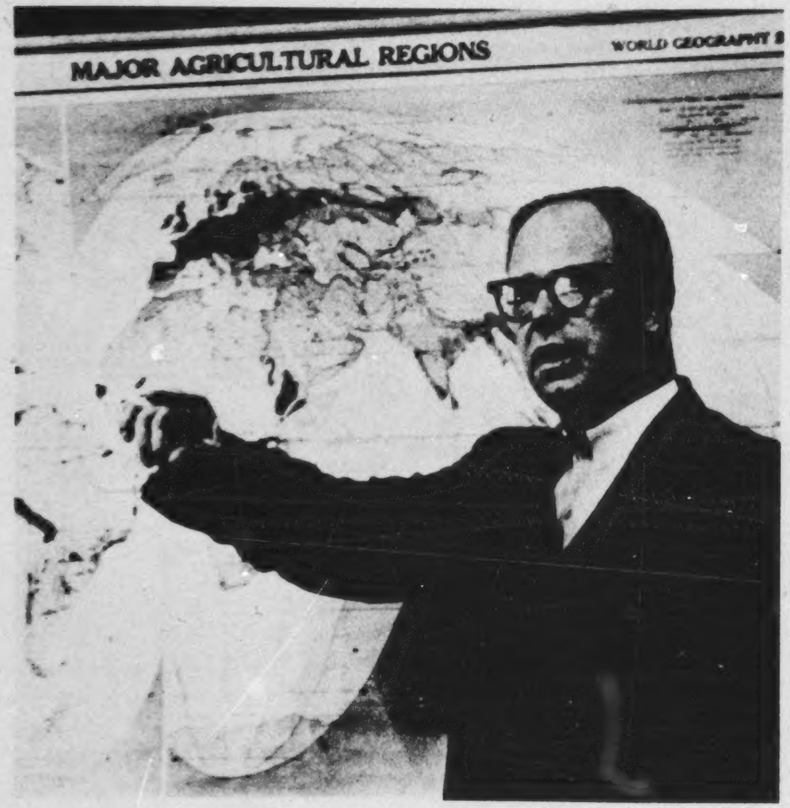
Nature of the Work

Geographers study the spatial characteristics of the earth—and all that is found on it. Such studies help to explain changing patterns of human settlement—where people live, why they are located there, and how they earn a living.

Most geographers are college or university teachers; some combine teaching and research. Their research includes the study and analysis of the distribution of land forms, climate, soils, vegetation, mineral, water, and human resources. They also analyze the distribution and structure of political organizations, transportation systems, marketing systems, urban systems, agriculture, and industry. Many geographers spend considerable time in field study, and in analyzing maps, aerial photographs, and observational data collected. Sometimes they use surveying and meteorological instruments. Photographs and other data from remote sensors on satellites are used increasingly as are modern statistical techniques. Other geographers construct maps, graphs, and diagrams.

Most geographers specialize in one branch or more of geography. *Economic geographers* deal with the geographic distribution of economic activities—including manufacturing, mining, farming, trade, and communications. *Political geographers* study the relationship of geographic conditions to political processes. *Urban geographers* study cities and their problems and make decisions about city development and community planning. (See statement on Urban Planners elsewhere in this book.) *Physical geographers* study the physical characteristics and processes affecting the earth. They typically specialize in a particular branch of physical geography such as hydrology or geomorphology. *Regional geographers* study the physical, economic, political, and cultural characteristics of a particular region or area, which may range in size from a river basin or an island, to a State, a country, or even a continent. *Cartographers* compile data and design and construct maps.

Many geographers have job titles such as cartographer, map analyst, or regional planner, that describe their specialization. Others have titles that relate to the subject matter of their study such as photo-intelligence specialist or climatological analyst. Still others have titles such as community or environmental planner, or market or business analyst.



Places of Employment

About 9,000 persons worked as geographers in 1974; about 15 percent were women.

Colleges and universities employ more than two-thirds of all geographers. The Federal Government employs a large number, mostly in the Washington, D.C. area. Among Federal agencies, the Department of Defense employs the largest number in such agencies as the Defense Mapping Agency, Naval Intelligence, and the Defense Intelligence Agency. The Commerce Department employs geographers in such agencies as the Bureau of the Census, Office of Regional Commissions, National Oceanic and Atmospheric Administration and National Weather Service. Geographers employed by the Interior Department work in such agencies as the Bureau of Indian Affairs, Bureau of Outdoor Recreation, and Bureau of Land Management and Geological Survey. Other Government agencies that employ geographers include the Central Intelligence Agency (CIA), Office of Emergency Preparedness, National Aeronautical and Space Administration (NASA), and the Library of Congress.

State and local governments also employ small numbers of geographers, mostly on city and State planning and development commissions.

A small but growing number of geographers work in private industry. Most work in research divisions of textbook and map publishers, travel agencies, manufacturing firms, or chain stores. Others work for scientific foundations and research institutes.

Training, Other Qualifications, and Advancement

The educational requirement for beginning positions in geography is usually a bachelor's degree with a major in the field. Bachelor's degree holders would find it helpful to have training in a specialty such as cartography or economic geography.

A master's degree is usually required for the position of college instructor. In many colleges and universities, however, a Ph. D. degree is essential for high-level teaching, research, and administrative positions.

About 400 colleges and universities offered degree training in geography in 1974. Undergraduate study provides a general introduction to geographic knowledge and research methods and often includes some field studies. Typical courses offered are physical and cultural geography, weather and climate, economic geography, political geography, urban geography and quantitative methods in geography. Courses in cartography and in the interpretation of maps and aerial and satellite photographs also are offered.

In 1974, 115 institutions offered master's degree programs; 54 offered Ph. D. programs. Applicants are required to have a bachelor's degree in any of the social or physical sciences with some background in geography. Requirements for advanced degrees include field and laboratory work as well as advanced classroom studies in geography and thesis preparation. Many graduate schools also require course work in advanced mathematics and computer science because of the increasing emphasis on these areas in the field. A language is required for those students who plan to enter the field of foreign regional geography.

Persons who want to become geographers should enjoy reading, studying, and research because they must keep abreast of developments in the field. Geographers must work with abstract ideas and theories as well as do practical studies. They also must be able to work independently and communicate their ideas orally and in writing.

Employment Outlook

Employment of geographers is expected to grow faster than the average for all occupations through the mid-1980's. However, growth in college and university teaching, which will remain the largest area of employment for geographers, is likely to be slow. Many opportunities are becoming available in the field of environmental management and planning. The Federal Government will need additional personnel to work in programs such as regional development, environmental quality, and intelligence. Employment of geographers in State and local government is expected to expand, particularly in areas such as conservation, environmental quality, highway planning, and city, community, and regional planning and development. Private industry also is expected to employ increasing numbers of geographers for market research and location analysis.

The employment outlook for geographers with the Ph. D. is expected to be favorable through the mid-1980's for positions in research and teaching in colleges and universities and for research jobs in industry and government. Those with the master's degree are likely to face competition for choice academic positions; however, expanding geography programs in junior colleges should provide some jobs.

Graduates who have only the bachelor's degree in geography may find positions connected with making, interpreting, or analyzing maps; or in research either working for government or industry. Others may obtain employment as research or teaching assistants in educational institutions while studying for advanced degrees. Some bachelor's degree holders do teach at the high school level, although in some States, the master's degree is becoming essential for high school teaching positions. Others earn library science degrees and become map librarians.

Earnings and Working Conditions

Salaries of geographers in colleges and universities depend on their teaching rank and experience. Assistant professors entering the field with a Ph. D. and no experience started at between $11,000 and $12,000 in 1974, according to limited information. Nearly three-fourths of all geographers earned between $12,000 and $24,000 a year, according to a recent survey conducted by the Association of American Geographers. About one-fourth earned between $22,000 and $27,000, and a few, more than $27,000. Geographers in educational institutions usually have an opportunity to earn income from other sources, such as consulting work, special research, and publication of books and articles.

Geographers in the Federal Government with the bachelor's degree and no experience started at $8,500 or $10,520 a year in 1974, depending on their college records. Those with a master's degree started at $12,841 a year, and those with the Ph. D. at $15,481. Geographers in the Federal Government averaged around $22,200 in late 1974.

In general, salaries of experienced geographers are higher than the average for all nonsupervisory workers in private industry, except farming.

Sources of Additional Information

Additional information on a career as a geographer is available from:

Association of American Geographers, 1710 16th St. NW., Washington, D.C. 20009.

HISTORIANS

(D.O.T. 052.038 and .088)

Nature of the Work

History is the record of past events, institutions, ideas, and people. Historians describe and analyze the past through writing, teaching, and research. They relate their knowledge of the past to current events in an effort to explain the present.

Historians may specialize in the history of a specific country or area, or in a particular period of time—ancient, medieval, or modern. They also may specialize in the history of a field, such as economics, culture, military affairs, the labor movement, art, or architecture.

The number of specialties in history is constantly growing. Newer specialties are concerned with business archives, quantitative analysis, and the relationship between technological and other aspects of historical development. In this country, most historians specialize in the social or political history of either the United States or modern Europe; however, a growing number now specialize in African, Latin American, Asian, or Near Eastern history. Some historians specialize in phases of a larger historical field, such as the American Civil War.

Most historians are college teachers who, outside the classroom, lecture, write, and do research. Some are specialists called *archivists*, who are associated with museums, special libraries, and historical societies. A few serve as consultants to editors, publishers, and producers of materials for radio, television, and motion pictures. Some historians are administrators in government or researchers who prepare studies, articles, and books on their findings.

Places of Employment

About 26,000 people worked as professional historians in 1974; more than 13 percent were women. Colleges and universities employ about two-thirds of all historians. Historians also work in archives, libraries, museums, junior colleges, secondary schools, research and editing organizations, and Government. Historians employed in the Federal Government work principally in the National Archives, or in the Departments of Defense, Interior, and State. A small but growing number work for State and local governments.

Since history is taught in all U.S. institutions of higher education, many historians are found in college communities. Many historians in the Federal Government are employed in Washington, D. C. Historians in other types of employment usually work in localities having museums or libraries with collections adequate for historical research.

Training, Other Qualifications, and Advancement

Graduate education usually is necessary for employment as a historian. A master's degree in history is the minimum requirement for the position of college instructor. In many colleges and universities, however, a Ph. D. degree is essential for high-level teaching, research, and administrative positions. Most historians in the Federal Government and in nonprofit organizations have Ph. D. degrees, or their equivalent in training and experience.

Although the combination of the bachelor's degree and a major in history is sufficient training for some beginning jobs in government— either Federal, State, or local—people in such jobs may face limited advancement opportunities. A knowledge of archival work is helpful, since beginning jobs are likely to be concerned with collection and preservation of historical data. For some jobs in international relations and journalism an undergraduate major in history is considered helpful.

Training for historians is available in many colleges and universities. Over 1,100 schools offer programs for the bachelor's degree; about 380, the master's; and about 130, doctorates.

History curriculums in the Nation's colleges and universities are varied; however, each basically provides, in addition to history topics, training in research methods, writing, and speaking. These are the basic skills essential for historians in all positions. Quantitative methods of analysis, including computer techniques, are increasingly important for historians; many college programs include them.

Historians spend a great deal of time studying, doing research, writing papers and reports, and giving lectures and presentations. In order to do these things well, they must be capable of communicating their ideas effectively, orally and in writing. The ability to work both independently and as part of a group is essential.

Employment Outlook

Employment of historians is expected to grow about as fast as the average for all occupations through the mid-1980's. Historians will be needed to fill positions in colleges and universities, junior colleges, libraries, archives, museums, secondary schools, research and editorial organizations, and government. Demand also will be strong for people with training in historical specialties such as business history, as well as those who use quantitative methods in their research. In addition to jobs created by growth of the field, an even larger number of openings for historians each year over the projected period is expected to result from the need to replace those who retire, die, or leave the profession.

Although information is limited on patterns of entry to the field, the number of persons seeking to enter the occupation will probably exceed available positions. As a result, historians who have a Ph. D. are expected to face keen competition for the more desirable positions through the mid-1980's, especially for jobs in the academic community. Historians having only the master's degree will encounter very keen competition for jobs, but some teaching positions may be available in junior colleges or some high schools for those who meet State certification requirements. People having only a bachelor's degree in history may find limited opportunities as professional historians.

Earnings

Starting salaries for historians having a doctorate averaged around $13,000 a year in 1974, according to limited information; master's degree holders had average starting salaries of around $11,000 a year.

Salaries of historians in educational institutions averaged over $18,000 in 1974; in State and local governments, over $14,000; in nonprofit organizations, nearly $18,000; and in private industry, nearly $20,000 a year. The annual median salary for historians was around $15,500 in 1974. In general, salaries of experienced historians are higher than the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, historians having a bachelor's degree could start at $8,500 or $10,520 a year in 1974, depending upon the applicant's academic record. Starting salaries for those having a master's degree were $12,841 a year, and for those having a Ph. D., $15,481. Historians in the Federal Government averaged around $22,800 a year in late 1974.

Many historians, particularly those in college teaching, supplement their income by summer teaching or writing books or articles. A few earn additional income from lectures.

Sources of Additional Information

Additional information on employment opportunities for historians is available from:

American Historical Association, 400 A St. SE., Washington, D.C. 20003.

POLITICAL SCIENTISTS

(D.O.T. 051.088)

Nature of the Work

Political scientists study the functions and workings of governments. Many of them specialize in a general area of political science including political theory, U.S. political institutions and processes, comparative political institutions and processes, or international relations and organizations. Some specialize in a particular type of political institution or in the politics of a specific era.

Most political scientists teach in colleges and universities where they combine research, consultation, or administrative duties with teaching. Some are primarily researchers who survey public opinion on political questions for private research organizations, or study proposed legislation for Federal, State, and municipal governments, legislative reference bureaus or congressional committees. Others analyze the operations of government agencies, specialize in foreign affairs, or do research for either government or nongovernment organizations. Some administer government programs.

Places of Employment

About 11,500 persons worked as political scientists in 1974; 10 percent were women. About four-fifths work in colleges and universities. Most of the remainder work in government, research bureaus, civic and taxpayers associations, and large business firms.

Political scientists can be found in nearly every college or university town since courses in government and political science are taught in almost all institutions of higher education. Some work overseas primarily for agencies of the U.S. Department of State, such as the Foreign Service, and the U.S. Agency for International Development. They also work for the U.S. Information Agency.

Training, Other Qualifications, and Advancement

Graduate training generally is required for employment as a political scientist. Completion of the requirements for the Ph. D. degree, except the doctoral dissertation, is

A political scientist explains the results of a public opinion survey.

the usual prerequisite for appointment as a college instructor. A Ph. D. degree is required for advancement to the position of assistant professor. The Ph. D. also is helpful for advancement in nonacademic areas.

College graduates having a master's degree can qualify for various administrative and research positions in government and in nonprofit research or civic organizations. A master's degree in international relations, foreign service, or area study (for example, Soviet Government) is helpful in obtaining positions in Federal Government agencies concerned with foreign affairs.

People with only a bachelor's degree in political science may qualify as trainees in public relations, research, budget analysis, personnel, or investigation fields. Many students with bachelor's degrees in political science go on to study law or some specialized or related branch of political science, such as public administration and international relations.

In 1974, about 760 colleges and universities offered a bachelor's degree in political science, 270 had master's programs, and 113 had doctoral programs. Many colleges and universities offer field training and internships to gain experience in government work.

Undergraduate programs in political science vary throughout the Nation. A typical undergraduate curriculum in political science includes introductory politics, State and urban politics, comparative studies, political theory, foreign policy, and public administration. An increasing number have courses in quantitative and statistical methods including the use of computers because of increased research emphasis in the field.

Persons planning careers as political scientists should like to work with details. They must be objective and able to work independently or as part of a team. Ability to express themselves clearly, orally and in writing, is important to political scientists.

Employment Outlook

The number of persons who will graduate with advanced degrees in political science is likely to exceed available job openings. Those having a Ph. D. may face stiff competition finding choice academic positions. Master's degree holders may face very keen competition finding positions as college and university instructors, but those having specialized training in areas such as policy analysis or public administration should have some opportunities in Federal, State and local government, research bureaus, political organizations and welfare agencies. New graduates having only the bachelor's degree are expected to find very limited opportunities. However, for those planning to continue their studies in law, foreign affairs, journalism, and other related fields, a political science background is very helpful. Some who meet State certification requirements will be able to enter high school teaching.

Employment of political scientists is expected to increase about as fast as the average for all occupations through the mid-1980's. The largest area of employment will continue to be in college and university teaching. In addition to those required to staff new positions, political scientists will be needed to fill positions vacated due to retirements, death or transfers.

Earnings

The median annual salaries of political scientists employed in educational institutions in 1973-74 were: $19,500 for full professors; $15,000 for associate professors; $12,500 for assistant professors;

and $10,500 for instructors. In general, salaries of experienced political scientists are higher than the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for those having a bachelor's degree was $8,500 or $10,520 a year in late 1974, depending upon the applicant's academic record. Starting salaries for those having a master's degree were $12,841 a year, and for those having a Ph. D., $15,481. Political scientists in the Federal Government averaged around $26,200 in late 1974.

Some political scientists, particularly those in college teaching, supplement their income by teaching summer courses or consulting.

Sources of Additional Information

Additional information on employment opportunities in political science and public administration is available from:

American Political Science Association,
1527 New Hampshire Ave. NW.,
Washington, D.C. 20036.

PSYCHOLOGISTS

(D.O.T. 045.088 and .108)

Nature of the Work

Psychologists study the normal and abnormal behavior of individuals and groups in order to understand and explain their actions. In the course of their work, they may be concerned with the problems of emotional stress and abnormal behavior, the causes of low morale, or the effective performance of an astronaut. Some teach in colleges and universities; others provide counseling services, plan and conduct training programs for workers, conduct research, advise on psychological methods and theories, or administer psychology programs in hospitals, clinics, or research laboratories. Many psychologists combine several of these activities.

Psychologists gather information about the capacities, interests, and behavior of people in various ways. They interview individuals, develop and administer tests and rating scales, study personal histories, and conduct controlled experiments. Also, psychologists often design and conduct surveys.

Areas of specialization in psychology include *experimental psychology*—in which behavior processes are studied in the laboratory; *developmental psychology*—the study of the causes of behavioral changes as people progress through life; *personality*—the study of the processes by which a person becomes a unique individual; *social psychology*—in which people's interactions with others and with the social environment are examined; *educational and school psychology*—which are concerned with the psychological factors related to the process of education; *comparative psychology*—in which the behavior of different animals, including man, is compared; *physiological psychology*—the study of the relationship of behavior to the biological functions of the body; and *psychometrics*—the development and application of procedures for measuring psychological variables.

Psychologists often combine several areas of psychology in their specialty. *Clinical psychologists* are

A psychologist (right) observes an infant with its mother as part of a psychological study.

the largest group of specialists. They generally work in mental hospitals or clinics, and are involved mainly with problems of mentally or emotionally disturbed people. Clinical psychologists may also deal with the emotional impact of injury or disease, helping the client to readjust to life with altered physical capabilities. They interview patients, give diagnostic tests, provide individual, family, and group psychotherapy, and design and carry through behavior modification programs. *Counseling psychologists* help people with important problems of everyday living. In their work, they may use any of a number of counseling techniques. Other combined fields are *industrial and organizational psychology* where problems of motivation and morale in work situations are studied; *engineering psychology*, the development and improvement of man-machine systems; *consumer psychology*, the study of the psychological factors that determine an individual's behavior as a consumer of goods and services; and *environmental psychology*, the relationships between individuals and their environment.

Places of Employment

About 75,000 people, two-fifths of them women, worked as psychologists in 1974. More than 40 percent of the total work in colleges and universities, either as teachers, researchers, or counselors. The second largest group of psychologists work for Federal, State, and local government agencies. Federal agencies that employ the most psychologists are the Veterans Administration, the Department of Defense, and the Public Health Service.

Many psychologists work in public schools, clinics, hospitals, medical schools, and for business or industry. Some are in independent practice, and others serve as commissioned officers in the Armed Forces and the Public Health Service.

Training, Other Qualifications, and Advancement

Generally, a master's degree in psychology is the minimum educational requirement for professional employment in the field. People who have this degree can qualify for positions where they administer and interpret psychological tests, collect and analyze statistical data, conduct research experiments, and perform administrative duties. They also may teach in colleges, counsel students or handicapped persons, or—if they have had previous teaching experience—work as school psychologists or counselors. (See statements on School Counselors and Rehabilitation Counselors.)

A Ph. D. degree is needed for many entrance positions and is becoming increasingly important for advancement. People who have doctorates in psychology qualify for the more responsible research, clinical, and counseling positions, as well as for the higher level positions in colleges and universities and in Federal and State programs.

At least 1 year of full-time graduate study is needed to earn a master's degree in psychology. An additional 3 to 5 years of graduate work usually are required for a Ph. D. In clinical or counseling psychology, the requirements for the Ph. D. degree generally include an additional year of internship or supervised experience.

Some universities require applicants for graduate work in psychology to have had an undergraduate major in that field. Others prefer broader educational backgrounds that include not only some basic psychology but also courses in the biological, physical, and social sciences, statistics, and mathematics. Competition for acceptance into graduate psychology programs is expected to be strong. Only the most highly qualified applicants can expect to be admitted to graduate study.

Many graduate students receive financial help in the form of fellowships, scholarships, or part-time employment from universities and other sources. Several Federal agencies provide funds to graduate students, generally through the college or university that provides the training. The Veterans Administration offers a number of predoctoral traineeships which provide payments to students while they gain supervised experience in VA hospitals and clinics. The National Science Foundation, the U.S. Office of Education, the Public Health Service, the Rehabilitation Services Administration, and the National Institute of Mental Health also provide fellowships, grants, and loans for advanced training in psychology. However, the present trend at the Federal level is toward providing low-interest loans rather than fellowships and grants.

The American Board of Professional Psychology awards diplomas in clinical, counseling, industrial, and school psychology to those who have outstanding educational records and experience and who pass the required examinations.

Psychologists who want to enter independent practice must meet certification or licensing requirements in an increasing number of States. In 1974, 47 States and the District of Columbia had these requirements.

People pursuing a career in psychology must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, patience, and a genuine interest in others are particularly important for work in clinical and counseling psychology. Research psychologists should be able to do detailed and independent work; verbal and writing skills are necessary to communicate research findings.

Employment Outlook

Employment opportunities for psychologists are expected to be generally favorable through the mid-1980's. Opportunities should be very good for Ph. D.'s and for some master's degree holders especially those specializing in clinical or counseling psychology. However, as more and more people become trained in psychology, competition for jobs will grow. A doctorate degree will become increasingly important for those wishing to enter the field.

Employment of clinical, counseling, and social psychologists in mental hospitals, correctional institutions, mental hygiene clinics, and community health centers is expected to expand rapidly. Many openings for psychologists also are anticipated in the Federal Government, primarily in the Veterans Administration and the Department of Defense.

Psychologists may find strong competition for job openings in large colleges and universities, which are preferred locations for many specialties in psychology. However, those willing to work in the relatively smaller and newer publicly supported institutions should have better employment prospects. The growth in enrollment in 2-year colleges also will create new teaching positions for psychologists.

Several other factors should help maintain a strong demand for psychologists. Growing awareness of the need for testing and counseling children is expected to increase the need for psychologists in schools. Increased public concern for the development of human resources will further increase the demand. The inclusion of psychological services in any national health insurance legislation also should improve employment prospects. Other openings may occur as psychologists move into new fields of employment where their services are beginning to be recognized as useful. Government agencies are also making increased use of the services which psychologists can provide. Also, many vacancies will occur each year as a result of retirements and deaths.

Earnings and Working Conditions

In 1974, starting salaries for psychologists holding a master's degree averaged about $11,000 a year, according to the American Psychological Association. Beginning salaries for those holding a doctorate averaged $13,000.

Median salaries of psychologists teaching in graduate departments ranged from about $13,000 for assistant professors to $21,600 for full professors during the academic year 1974-75 (9-10 months), according to a survey conducted by the American Psychological Association.

In the Federal Government, psychologists having a Ph. D. degree and 1 year of internship started at $15,481 a year in late 1974. With 1 year of experience, Ph. D.'s earned $18,463, and with 2 years, $21,816. The average salary for Ph. D. psychologists in the Veterans Administration was about $24,700 a year. The median salary for a Ph. D. psychologist working in a clinic or hospital was about $19,000. Ph. D. psychologists in private practice generally have considerably higher earnings than those in other settings. Median annual income for those psychologists (working full time) is over $32,000. In general, psychologists earn over twice as much as the average nonsupervisory worker in private industry, except farming.

Working conditions for psychologists who teach in colleges and universities are the same as for other faculty members. Most colleges provide for sabbatical leaves of absence, life and health insurance, and retirement plans. Working hours are generally flexible, but often entail some evening work with individual students or groups. Clinical and counseling psychologists often work in the evenings since their patients sometimes are unable to leave their jobs or school during the day.

Sources of Additional Information

For general information on career opportunities, certification or licensure requirements, and educational facilities and financial assistance for graduate students in psychology, contact:

American Psychological Association, 1200 17th St. NW., Washington, D.C. 20036.

Information on traineeships and fellowships is available from colleges and universities that have graduate psychology departments.

SOCIOLOGISTS

(D.O.T. 054.088)

Nature of the Work

Sociologists study the groups that man forms in his association with others. These groups include families, tribes, communities, and governments, along with a variety of social, religious, political, business, and other organizations. They study their behavior and interaction; trace their origin and growth; and analyze the influence of group activities on individual members.

Some sociologists concern themselves primarily with the characteristics of social groups and institutions. Others are more interested in the ways individuals are affected by groups to which they belong.

Many sociologists specialize in social organization, social psychology, or rural sociology. Others specialize in intergroup relations, family problems, social effects of urban living, population studies, or analyses of public opinion. Some conduct surveys or concentrate on research methods.

Sociologists frequently collaborate on research.

Growing numbers apply sociological knowledge and methods in penology and correction, education, public relations in industry, and regional and community planning. A few specialize in medical sociology—the study of social factors that affect mental and public health.

Most sociologists are college and university teachers whose duties include both teaching and research. Sociological research involves the collection of information, preparation of case studies, testing, and the conduct of statistical surveys and laboratory experiments.

Sociologists also supervise research projects or the operation of social agencies such as family and marriage clinics. Others, acting as consultants, advise on diverse problems such as the management of hospitals for the mentally ill, the rehabilitation of juvenile delinquents, or the development of effective advertising programs to promote public interest in particular products such as television sets or cars.

Places of Employment

About 14,000 persons worked as sociologists in 1974—one-fifth of them women.

Colleges and universities employ over four-fifths of all sociologists. A number work for Federal, State, local, or international government agencies, in private industry, or in welfare or other nonprofit organizations, or else are self-employed. Others work in positions that require training in this field but are not classified as professional sociologists. These fields include social, recreation, and public health work.

Since sociology is taught in most institutions of higher learning, sociologists may be found in nearly all college communities. They are most heavily concentrated, however, in large colleges and universities which offer graduate training in sociology and opportunities for research.

Training, Other Qualifications, and Advancement

A master's degree and a major in sociology usually is the minimum requirement for employment as a sociologist. The Ph. D. degree is essential for attaining a professorship in most colleges or universities. It also is commonly required for directors of major research projects, important administrative positions, or consultants.

Sociologists having master's degrees, who are trained in research and statistical and computer methods, can qualify for many administrative and research positions. Advancement to supervisory positions in both public and private agencies is gained through experience. Sociologists having a master's degree may qualify for some college instructorships. Most colleges, however, appoint as instructors only people who have training beyond the master's level—frequently the completion of all requirements for the Ph. D. degree except the doctoral dissertation. Outstanding graduate students often get teaching or research assistantships which provide both financial aid and valuable experience.

Bachelor's degree holders in sociology may get jobs as interviewers or as research assistants. Many work as caseworkers, counselors, recreation workers, or administrative assistants in public and private welfare agencies. Sociology majors who have sufficient training in statistics may get positions as beginning statisticians. Those who meet State certification requirements can teach at a high school. About 900 colleges and universities offer bachelor degree programs in sociology; more than 200 offer master's degrees, and about 110 have doctoral programs.

The choice of a graduate school is important for people who want to become sociologists. Students interested in research should select schools that emphasize training in research, statistical, and computer methods. Opportunities to gain practical experience in research work also may be available. Professors and heads of sociology departments frequently aid in the placement of graduates.

Sociologists spend a great deal of their time in study and research. They must be able to communicate effectively, both orally and in writing. The ability to work as part of a group as well as independently is important.

Employment Outlook

The number of persons who will graduate with advanced degrees in sociology is likely to exceed available job openings. Those having a Ph. D. may face competition finding choice academic positions. Those having only a master's degree will probably continue to face considerable competition for academic positions, but some jobs will be available in government and private industry. Sociologists well trained in research methods, advanced statistics, and the use of computers will have the widest choice of jobs. Demand is expected to be strong for research personnel to work in the areas of rural sociology, community development, population analysis, public opinion research, medical sociology, and juvenile delinquency and education.

Employment of sociologists is expected to increase about as fast as the average for all occupations through the mid-1980's. Some openings will result from the growing trend to include sociology courses in the curriculums of other professions, such as medicine, law, and education. Demand in the nonteaching area will center around public and private programs dealing with the development of human resources, particularly those designed to cope with social and welfare problems. In addition to growth needs, several hundred openings will occur each year to replace sociologists who die, retire, or leave the field for other reasons.

Earnings and Working Conditions

In 1974, sociologists working in educational institutions on a calendar year basis averaged about $18,000. Those working in nonprofit organizations and private industry averaged around $17,500 and $20,000 a year, respectively. In general, salaries of experienced sociologists are higher than the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for those having a bachelor's degree was $8,500 or $10,520 a year in 1974, depending upon the applicant's academic record. Starting salaries for those having a master's degree were $12,841 a year, and for those having a Ph. D., $15,481. Sociologists in the Federal Government averaged around $23,300 in late 1974.

In general, sociologists having the Ph. D. degree earn substantially higher salaries than those having master's degrees. Many sociologists, particularly those employed by colleges and universities for the academic year (September to June), are likely to supplement their regular salaries with earnings from other sources, such as summer teaching and consulting work.

Sources of Additional Information

Additional information on sociologists is available from:

The American Sociological Association,
1722 N St., NW., Washington, D.C. 20036.

SOCIAL SERVICE OCCUPATIONS

Workers in the social service occupations help to improve the lives of the population they serve by providing a wide range of information and services. Depending on their specific occupation, they may advise consumers on how to get the most for their money; help handicapped people to achieve satisfactory lifestyles; provide religious services; counsel people having problems in their job, home, school, or social relationships; or treat people having emotional problems.

Although social services are provided in many different settings, people in these occupations require many of the same skills. In general, a knowledge of the field is gained through formal education, and the ability to apply this knowledge is improved and refined through work experience.

A genuine concern for people and a desire to help them to improve their lives are important for anyone considering a career in the social service field. Patience, tact, sensitivity, and compassion are necessary personal qualities.

COUNSELING OCCUPATIONS

Counselors help people to understand themselves and their opportunities so that they can make and carry out decisions and plans for a satisfying and productive life. Whatever the area of counseling—personal, educational, or vocational—counselors must combine objectivity with genuine concern for each client. They must believe in the uniqueness and worth of each individual, in his right to make and accept responsibility for his own decisions, and in his potential for development.

This section covers four counseling specialties: school; rehabilitation; employment; and college career planning and placement.

School counselors are the largest counseling group. Their main concern is the personal and social development of students and helping them plan and achieve their educational and vocational goals.

Rehabilitation counselors work with persons who are physically, mentally, or socially handicapped. Their counseling is generally job-oriented, but also involves personal problems.

Employment counselors are mainly concerned with career planning and adjustment of young, old, disabled, and other persons.

College career planning and placement counselors help college students examine their own interests, abilities, and goals; explore career alternatives; and make and follow through with a career choice.

Persons who want to enter the counseling field must be interested in helping people and have an ability to understand their behavior. A pleasant but strong personality that instills confidence in clients is desirable. Counselors also must be patient, sensitive to the needs of others, and able to communicate orally as well as in writing.

Many psychologists, social workers, and college student personnel workers also do counseling. These and other fields which entail some counseling such as teaching, health, law, religion, and personnel, are described elsewhere in this book.)

SCHOOL COUNSELORS

(D.O.T. 045.108)

Nature of the Work

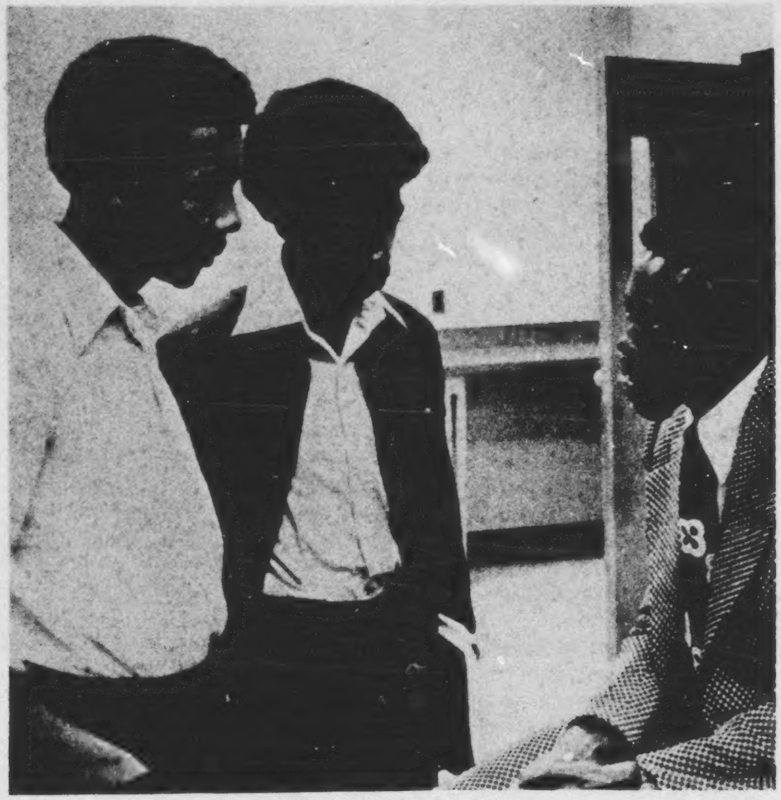
School counselors are concerned about the educational, career, and social development of students. They work with students, both individually and in groups, as well as with teachers, other school personnel, parents, and community agencies.

Counselors use the results of interest, achievement, and intelligence tests as well as school and other records to help students evaluate themselves. Then, with each student and sometimes with the parents, they help develop an educational plan that fits the student's abilities, interests, and career aspirations.

School counselors often maintain a small library containing occupational literature so that students may find descriptions of work that they have heard about or in which they have an interest. Information on training requirements, earnings, and employment outlook often is included with these job descriptions. Computers that students can use to look up this information themselves are being tried in some instances.

Counselors sometimes arrange trips to factories and business firms, and show vocational films to provide a view of real work settings. To bring the workplace into the school, the counselor may conduct "career day" programs.

School counselors must keep up-to-date on opportunities for educational and vocational training beyond high school to counsel students who want this information. They must keep informed about training programs in 2-and 4-year colleges; in trade, technical, and business schools; apprenticeship programs; and available federally supported programs. Counselors also advise students about educational requirements for entry level



jobs, job changes caused by technological advances, college entrance requirements, and places of employment.

Counselors in high schools often help students find part-time jobs, either to enable them to stay in school or to help them prepare for their vocation. They may help both graduates and dropouts to find jobs or may direct them to community employment services. They also may conduct surveys to learn more about hiring experiences of recent graduates and dropouts, local job opportunities, or the effectiveness of the educational and guidance programs. Many help students individually with personal and social problems or lead group counseling sessions and discussion groups on topics related to student interests and problems.

Elementary school counselors help children to make the best use of their abilities by identifying these and other basic aspects of the child's makeup at an early age, and by evaluating any learning problems. Methods used in counseling grade school children differ in many ways from those used with older students. Observations of classroom and play activity furnish clues about children in the lower grades. To better understand children, elementary school counselors spend much time consulting with teachers and parents. They also work closely with other staff members of the school, including psychologists and social workers.

Some school counselors, particularly in secondary schools, teach classes in occupational information, social studies, or other subjects. They also may supervise school clubs or other extracurricular activities, often after regular school hours.

Places of Employment

About 44,000 people worked full time as public school counselors during 1974. Most counselors work in large schools. An increasing number of school districts, however, provide guidance services to their small schools by assigning more than one school to a counselor.

Training, Other Qualifications, and Advancement

Most States require school counselors to have counseling and teaching certificates. However, a growing number of States no longer require teacher certification. (See statements on Elementary and Secondary School Teachers for certificate requirements.) Depending on the State, graduate work and from 1 to 5 years of teaching experience usually are required for a counseling certificate. People who plan to become counselors should learn the requirements of the State in which they plan to work since requirements vary among States and change rapidly.

College students interested in becoming school counselors usually take the regular program of teacher education, with additional courses in psychology and sociology. In States where teaching experience is not a requirement, it is possible to major in a liberal arts program. A few States substitute counseling internship for teaching experience. In some States teachers who have completed part of the courses required for the master's degree are eligible for provisional certification and may work as counselors under supervision while they take additional courses.

Counselor education programs at the graduate level are available in more than 440 colleges and universities, most frequently in the departments of education or psychology. One to two years of graduate study are necessary for a master's degree. Most programs provide supervised field experience.

Subject areas of required graduate level courses usually include appraisal of the individual student, individual counseling procedures, group guidance, information service for career development, professional relations and ethics, and statistics and research.

The ability to help others accept responsibility for their own lives is important for school counselors because their work concerns the development of young people. They must be able to coordinate the activity of others and work as part of the team which forms the educational system.

School counselors may advance by moving to a larger school; becoming director or supervisor of counseling or guidance; or, with further graduate education, becoming a college counselor, educational psychologist, or school psychologist.

Employment Outlook

Employment of school counselors is likely to grow more slowly than the average for all occupations through the mid-1980's as the decline in school enrollments continues during the remainder of this decade. However, some positions will continue to be available in elementary schools. An expected upswing in enrollments beginning in the early 1980's should stimulate some expansion in employment, and additional counselors will be required each year to replace those who leave the profession.

In 1974, the average ratio of counselors to students as a whole was still well below generally accepted standards, despite Federal aid to the States for support and expansion of counseling programs. Some school systems were forced to eliminate some counselor positions due to local financial problems. Over the long run, demand for school counselors will depend in large part on the Federal Government's Career Education Program. This program is designed to inform children about the world of work early in their education, so that by the time they leave the formal educational system they are prepared for a suitable and available career. The extent of future growth in counselor employment will depend largely on the amount of funds which the Federal Government provides to the States.

Earnings and Working Conditions

School counselors holding bachelor's degrees earned average annual salaries ranging from $9,000 to $13,000 during 1974, according to the limited data available. For those having master's degrees, average yearly salaries were from $10,400 to $15,500. School counselors with doctorates had an average maximum salary of almost $18,200 per year. School counselors generally earn more than teachers at the same school. (See statements on Kindergarten and Elementary School Teachers and Secondary School Teachers.)

In most school systems, counselors receive regular salary increments as they obtain additional education and experience. Some counselors supplement their income by part-time consulting or other work with private or public counseling centers, government agencies, or private industry.

Sources of Additional Information

State departments of education can supply information on colleges and universities that offer training in guidance and counseling as well as on the State certification requirements.

Additional information on this field of work is available from:

American School Counselor Association,
1607 New Hampshire Ave. NW.,
Washington, D.C. 20009.

EMPLOYMENT COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Employment counselors (sometimes called vocational counselors) help jobseekers evaluate their abilities and interests so that they can choose, prepare for, and adjust to a satisfactory field of work. The extent of counseling services given by employment counselors varies, depending on the job-seeker and the type of agency. Job-seekers may include veterans, youth with little or no work experience, the handicapped, older workers, and individuals displaced by automation and industry shifts or unhappy with their present occupational fields. Sometimes jobseekers are skilled in specific occupations and ready for immediate job placement, while those who have little education and lack marketable skills need intensive training to prepare for jobs. In State employment services, the counselor is also concerned with helping those who are least employable, such as welfare recipients, prison releasees, and the educationally and culturally deprived.

Counselors interview jobseekers to learn employment-related facts about their interests, training, work experience, work attitudes, physical capacities, and personal traits. If necessary, they may get additional data by arranging for aptitude and achievement tests and interest inventories, so that more objective help may be given. They may get additional information from sources such as former employers and schools.

When a jobseeker's background—the person's limitations and abilities—has been thoroughly reviewed, the employment counselor discusses occupational requirements and job opportunities in different fields within the potential of the jobseeker. Then, the counselor and the client

develop a vocational plan. This plan may specify a series of steps involving remedial education, job training, work experience, or other services needed to enhance the person's employability. Often, in developing this plan, the employment counselor works with a team of specialists.

In many cases, employment counselors refer jobseekers to other agencies for physical rehabilitation or psychological or other services before or during counseling. Counselors must be familiar with the available community services so that they can select those most likely to benefit a particular jobseeker.

Counselors may help jobseekers by suggesting employment sources and appropriate ways of applying for work. In many cases when further support and assistance are needed, counselors may contact employers to develop jobs for counseled applicants, although jobseekers usually are sent to placement interviewers after counseling. After job placement or entrance into training, counselors may follow up to determine if additional assistance is needed.

The expanding responsibility of public employment service counselors for improving the employability of disadvantaged persons has increased their contacts with these persons during training and on the job. Also, it has led to group counseling and the stationing of counselors in neighborhood and community centers.

Places of Employment

In 1974, about 3,500 persons, half of them women, worked as employment counselors in State employment service offices, located in every large city and many smaller towns. In addition, about 3,500 employment counselors worked for various private or community agencies, primarily in the larger cities. Some worked in institutions such as prisons, training schools for delinquent youths, and mental hospitals. Also, the Federal Government employed a limited number of employment counselors, chiefly in the Veterans Administration and in the Bureau of Indian Affairs. Some counselors teach in graduate training programs or conduct research.

Training, Other Qualifications, and Advancement

The national qualification standard for first level employment counselors in State employment service offices calls for 30 graduate semester hours of counseling courses beyond a bachelor's degree. However, 1 year of counseling-related experience may be substituted for 15 graduate semester hours.

All States require counselors in their public employment offices to meet State civil service or merit system requirements that include minimum educational and experience standards.

Applicants with advanced degrees and additional qualifying experience may enter at higher levels on the counselor career ladder. Many States also make provision for individuals with extensive experience in the employment service, whether or not they have college degrees, to enter the counselor career ladder and move upward by acquiring the prescribed university coursework and qualifying experience for each level.

Although minimum entrance requirements are not standardized among private and community agencies, most prefer, and some require, a master's degree in vocational counseling or in a related field such as psychology, personnel administration, counseling, guidance education, or public administration. Many private agencies prefer to have at least one staff member who has a doctorate in counseling psychology or a related field. For those lacking an advanced degree, employers usually emphasize experience in closely related work such as rehabilitation counseling, employment interviewing, school or college counseling, teaching, social work, or psychology.

In each State, the public employment service offices provide some in-service training programs for their new counselors or trainees. In addition, both their new and experienced counselors are often given part-time training at colleges and universities during the regular academic year or at institutes or summer sessions. Private and community agencies also often provide in-service training opportunities.

College students who wish to become employment counselors should enroll in courses in psychology and basic sociology. At the graduate level, requirements for this field usually include courses in techniques of counseling, psychological principles and psychology of careers, assessment and appraisal, cultures and environment, and occupational information. Counselor education programs at the graduate level are available in about 370 colleges and universities, mainly in departments of education or psychology. To obtain a master's degree, students must complete 1 to 2 years of graduate study.

Young people aspiring to be employment counselors should have a strong interest in helping others make vocational plans and carry them out. They should be able to work independently and to keep detailed records.

Well-qualified counselors with experience may advance to supervisory or administrative positions in their own or other organizations. Some may become directors of agencies or of other counseling services, or area supervisors of guidance programs; some may become consultants; and others may become professors in the counseling field.

Employment Outlook

Employment counselors with master's degrees or experience in related fields are expected to face some competition in both public and community employment agencies through the mid-1980's. Some growth in the number of employment counselors is expected as their role becomes more important in programs dealing with the training and retraining of unemployed workers, particularly those who are unskilled or whose jobs have been displaced by technological or industrial shifts. Expansion of these programs and consequently the extent of growth in employment of counselors will depend in large part on the level of funding by the Federal Government, as well as on the distribution of revenue sharing money allocated to these programs by the individual States. Some openings for employment counselors will result from the need to replace those who die, retire, or transfer to other occupations.

Earnings and Working Conditions

Salaries of employment counselors in State employment services vary considerably by State. In 1974, minimum salaries ranged from about $7,200 to $14,700 a year, with an average of $9,100. Maximum salaries ranged from $9,700 to $19,100, with an average of $11,900. More than three-quarters of the States listed maximum salaries of $11,900 or more. Trainees for counseling positions in some voluntary agencies in large cities were being hired at about $8,500 a year. Salaries of some employment counselors in private and community agencies were as high as $20,000 although the average was about $12,000 annually. In general, salaries of employment counselors are about 1 1/2 times as high as average earnings for all nonsupervisory workers in private industry, except farming.

Most counselors work about 40 hours a week and have various benefits, including vacations, sick leave, pension plans, and insurance coverage. Counselors employed in community agencies may work overtime.

Sources of Additional Information

For general information on employment or vocational counseling, contact:

National Employment Counselors Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

National Vocational Guidance Association, Inc., 1607 New Hampshire Ave. NW., Washington D.C. 20009.

U.S. Department of Labor, Manpower Administration, USES, Division of Counseling and Testing, Washington, D.C. 20210.

The administrative office for each State's employment security agency, bureau, division, or commission can supply specific information about local job opportunities, salaries, and entrance requirements for positions in public employment service offices.

REHABILITATION COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Rehabilitation counselors help people with physical, mental, or social disabilities to adjust their vocational plans and personal lives. Counselors learn about clients' interests, abilities, and limitations. They then use this information, along with available medical and psychological data, to help disabled persons evaluate themselves for the purpose of pairing their physical and mental capacity and interests with suitable work.

Together, the counselor and client develop a plan of rehabilitation, with the aid of other specialists responsible for the medical care and occupational training of the handicapped person. As the plan is put into effect, the counselor meets regularly with the disabled person to discuss his progress in the rehabilitation program and help resolve any problems that have been encountered. When the client is ready to begin work, the counselor helps him find a suitable job, and usually makes followup checks to insure that the placement has been successful.

Rehabilitation counselors must maintain close contact with the families of their handicapped clients, other professionals who work with handicapped people, agencies and civic groups, and private employers who hire the disabled. Counselors in this field often perform related activities, such as informing employers of the abilities of the handicapped and arranging for publicizing the rehabilitation program in the community.

An increasing number of counselors specialize in a particular area of rehabilitation; some may work almost exclusively with blind people, alcoholics or drug addicts, the mentally ill, or retarded persons. Others may work almost entirely with persons living in poverty areas.

The amount of time spent in counseling each client varies with the severity of the disabled person's problems as well as with the size of the counselor's caseload. Some rehabilitation counselors are responsible for many persons in various stages of rehabilitation; on the other hand, less experienced counselors or those working with the severely disabled may work with relatively few cases at a time.

Places of Employment

About 19,000 persons, one-third of them women, worked as rehabilitation counselors in 1974. About 70 percent worked in State and local rehabilitation agencies financed cooperatively with Federal and State funds. Some rehabilitation counselors and counseling psychologists worked for the Veterans Administration. Rehabilitation centers, sheltered workshops, hospitals, labor unions, insurance companies, special schools, and other public and private agenices with rehabilitation programs and job placement services for the disabled employ the rest.

Rehabilitation counselor assisting blind person in use of cassette tape recorder.

Training, Other Qualifications, and Advancement

A bachelor's degree with courses in counseling, psychology, and related fields is the minimum educational requirement for rehabilitation counselors. However, employers are placing increasing emphasis on the master's degree in vocational counseling or rehabilitation counseling, or in related subjects such as psychology, education, and social work. Work experience in fields such as vocational counseling and placement, psychology, education, and social work is an asset for securing employment as a rehabilitation counselor. Most agencies have work-study programs whereby employed counselors can earn graduate degrees in the field.

Usually, 2 years of study are required for the master's degree in the fields preferred for rehabilitation counseling. Included is a semester of actual work experience as a rehabilitation counselor under the close supervision of an instructor. Besides a basic foundation in psychology, courses generally included in master's degree programs are counseling theory and techniques, occupational and educational information, and community resources. Other requirements may include courses in placement and followup, tests and measurements, cultural and psychological effects of disability, and medical and legislative aspects of therapy and rehabilitation. About 85 schools offered graduate training in rehabilitation counseling in 1974.

To earn the doctorate in rehabilitation counseling or in counseling psychology may require a total of 4 to 6 years of graduate study. Intensive training in psychology and other social sciences, as well as in research methods, is required.

Many States require that rehabilitation counselors be hired in accordance with State civil service and merit system rules. In most cases, these regulations require applicants to pass a competitive written test, sometimes supplemented by an individual interview and evaluation by a board of examiners.

Since rehabilitation counselors deal with the welfare of individuals, the ability to accept responsibility is important. It also is essential that they be able to work independently and be able to motivate and guide the activity of others.

Counselors who have limited experience usually are assigned the less difficult cases. As they gain experience, their caseloads are increased and they are assigned clients with more complex rehabilitation problems. After obtaining considerable experience and more graduate education, rehabilitation counselors may advance to supervisory positions or top administrative jobs.

Employment Outlook

Employment opportunities for rehabilitation counselors are expected to be favorable through the mid-1980's. Persons who have graduate work in rehabilitation counseling or in related fields are expected to have the best employment prospects.

Contributing to the long-run demand for rehabilitation counselors will be population growth and the extension of service to a greater number of the severely disabled, together with increased public awareness that the vocational rehabilitation approach helps the disabled to become self-supporting. The extent of growth in employment of counselors, however, will depend largely on levels of government funding for vocational rehabilitation. In addition to growth needs, many counselors will be required annually to replace those who die, retire, or leave the field for other reasons.

Earnings and Working Conditions

Salaries of beginning rehabilitation counselors in State agencies averaged $9,300 a year in 1974. Experienced counselors earned average salaries of $12,200 a year; the range was $9,800 to $16,400 among the States.

The Veterans Administration paid counseling psychologists with a 2-year master's degree and 1 year of subsequent experience—and those with a Ph. D.—starting salaries of $15,481 in late 1974. Those with a Ph. D. and a year of experience, and those with a 2-year master's degree and much experience, started at $18,463. Some rehabilitation counselors with a bachelor's degree were hired at starting salaries of $10,520 and $12,841. In general, salaries of rehabilitation counselors are above the average earnings for all nonsupervisory workers in private industry, except farming.

Counselors may spend only part of their time in their offices counseling and performing necessary paperwork. The remainder of their time is spent in the field, working with prospective employers, training agencies, and the disabled person's family. The ability to drive a car often is necessary for fieldwork.

Rehabilitation counselors generally work a 40-hour week or less, with some overtime work required to attend community and civic meetings in the evening. They usually are covered by sick and annual leave benefits, and pension and health plans.

Sources of Additional Information

For information about rehabilitation counseling as a career, contact:

American Psychological Association, Inc., 1200 17th St. NW., Washington, D.C. 20036.

American Rehabilitation Counseling Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

National Rehabilitation Counseling Association, 1522 K St. NW., Washington, D.C. 20005.

COLLEGE CAREER PLANNING AND PLACEMENT COUNSELORS

(D.O.T. 166.268)

Nature of the Work

Choosing a career and deciding whether or not to go to graduate school are among the difficult decisions faced by many college students. Career planning and placement counselors are employed by colleges to offer encouragement and assistance in these decisions.

Career planning and placement counselors, sometimes called college placement officers, provide a variety of services to college students and alumni. They assist students in making career selections by encouraging them to examine their interests, abilities, and goals, and then helping them to explore possible career alternatives and to choose an occupational area that is best suited to their individual needs. They advise students considering dropping out of college of the opportunities open to them. They also help students to get part-time and summer jobs.

Career planning and placement counselors arrange for job recruiters to visit the campus to discuss their firm's personnel needs and to interview applicants. They provide employers with information about students and help in appraising students' qualifications. They must keep abreast of information concerning job market developments in order to contact prospective employers, help students prepare for promising fields, and encourage the faculty and college administration to provide pertinent courses. Most career counselors also assemble and maintain a library of career guidance information and recruitment literature.

Placement counselors may specialize in areas such as law, education, or part-time and summer work. However, the extent of specialization usually depends upon the size and type of college as well as the size of the placement staff.

Places of Employment

Nearly all 4-year colleges and universities and many of the increasing number of junior colleges provide career planning and placement services to their students and alumni. Large colleges may employ several counselors working under a director of career planning and placement activities; in many institutions, however, a combination of placement functions is performed by one director aided by a clerical staff. In some colleges, especially the smaller ones, the functions of career counselors may be performed on a part-time basis by members of the faculty or administrative staff. Universities frequently have placement officers for each major branch or campus.

About 4,100 persons, one-half of them women, worked as career planning and placement counselors in colleges and universities in 1974. Most were employed on a full-time basis. An additional 1,200 worked in junior colleges; about two-thirds worked part time.

Training, Other Qualifications, and Advancement

Although no specific educational program exists to prepare persons for career planning and placement work, a bachelor's degree, preferably in a behavioral science such as psychology or sociology, is customary for entry into the field, and a master's degree is increasingly being stressed.

In 1974, more than 100 colleges and universities offered graduate programs in college student personnel work. Graduate courses that are helpful for career planning and placement counseling include counseling theory and techniques, vocational testing, theory of group dynamics, and occupational research and employment trends.

Some people enter the career planning and placement field after gaining a broad background of experience in business, industry, government, or educational organizations. An internship in a career planning and placement office also is helpful.

College career planning and placement counselors must have an interest in people. They must be able to communicate with and gain the confidence of students, faculty, and employers in order to develop insight into the employment needs of both employers and students. People in this field should be energetic and able to work under pressure, since they must organize and administer a wide variety of activities.

Advancement for career planning and placement professionals usually is through promotion to an assistant or associate position, director of career planning and placement, director of student personnel services, or some other higher level administrative position. However, the extent of such opportunity usually depends upon the type of college or university and the size of the staff.

Counselor discusses career alternatives with college student.

Employment Outlook

The overall employment outlook for well-qualified college career planning and placement counselors is expected to be favorable through the mid-1980's. Employment growth in the field is expected to be about as fast as the average for all occupations as college enrollments continue to increase through the early 1980's. Demand will be greatest for persons with specialized training in career counseling in junior and community colleges, where, in many cases, there are no career planning and placement programs at present. Also contributing to the demand will be expected continued expansion in services to students from minority and low-income groups, who require special counseling in choosing careers and assistance in finding part-time jobs to help pay for their education. Growth is also expected in services to the handicapped and to adults participating in continuing education.

However, many institutions of higher education faced financial problems in 1974. If this situation persists, colleges and universities may be forced to limit expansion of counseling and placement services, resulting in competition for available positions during this period.

Earnings and Working Conditions

The average salary of college career planning and placement directors was more than $17,000 a year in 1974, according to limited information. Average salaries for directors in large public universities were $19,300; in small private colleges, about $10,700. Salaries for college career planning and placement counselors ranged from $7,000 to $15,000 a year.

Career planning and placement counselors frequently work more than a 40-hour week; irregular hours and overtime often are necessary, particularly during the "recruiting season." Most counselors are employed on a 12-month basis. They are paid for holidays and vacations and usually receive the same benefits as other professional personnel employed by colleges and universities.

Sources of Additional Information

A list of schools that offer courses in career counseling and placement and a booklet on the college student personnel professions, as well as other information on career counseling and placement, are available from:

The College Placement Council, Inc., P.O.
Box 2263, Bethlehem, Pa. 18001.

CLERGY

Deciding on a career in the clergy involves considerations different from those involved in other career choices. When young persons choose to enter the ministry, priesthood, or rabbinate, they do so primarily because they possess a strong religious faith and a desire to help others. Nevertheless, it is important for young people to know as much as possible about the profession and how to prepare for it, the kind of life it offers, and its needs for personnel.

The number of clergy needed depends largely on the number of people who participate in organized religious groups. This affects the number of churches and synagogues established and pulpits to be filled. In addition to the clergy who serve congregations, many others teach or act as administrators in seminaries and in other educational institutions; still others serve as chaplains in the Armed Forces, industry, correctional institutions, hospitals or on college campuses; or render service as missionaries or in social welfare agencies.

Persons considering a career in the clergy should seek the counsel of a religious leader of their faith to aid in evaluating their qualifications. The most important of these are a deep religious belief and a desire to serve the spiritual needs of others. The priest, minister, or rabbi also is expected to be a model of moral and ethical conduct. A person considering one of these fields must realize that the civic, social, and recreational activities of a member of the clergy often are influenced and restricted by the customs and attitudes of the community.

The clergy should be sensitive to the needs of others and able to help them deal with these needs. The job demands an ability to speak and write effectively, to organize, and to supervise others. The person entering this field also must enjoy studying because the ministry is an occupation which requires continuous learning. In addition, the ministry demands considerable initiative and self-discipline.

More detailed information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is given in the following statements, prepared in cooperation with leaders of these faiths. Information on the clergy in other faiths may be obtained directly from leaders of the respective groups.

PROTESTANT MINISTERS

(D.O.T. 120.108)

Nature of the Work

Protestant ministers lead their congregations in worship services and administer the rites of baptism, confirmation, and Holy Communion. They prepare and deliver sermons and give religious instruction to persons who are to become new members of the church. They also perform marriages; conduct funerals; counsel individuals who seek guidance; visit the sick, aged, and handicapped at home and in the hospital; comfort the bereaved; and serve church members in other ways. Many Protestant ministers write articles for publication, give speeches, and engage in interfaith, community, civic, educational, and recreational activities sponsored by or related to the interests of the church. Some ministers teach in seminaries, colleges, and universities.

The services that ministers conduct differ among Protestant denominations and also among congregations within a denomination. In many denominations, ministers follow a traditional order of worship; in others they adapt the services to the needs of youth and other groups within the congregation. Most services include Bible reading, hymn singing, prayers, and a sermon. In some denominations, Bible reading by a member of the congregation and individual testimonials may constitute a large part of the service.

Ministers serving small congregations generally work on a personal basis with their parishioners. Those serving large congregations have greater administrative responsibilities, and spend considerable time working with committees, church officers, and staff, besides performing their other duties. They may have one or more associates or assistants who share specific aspects of the ministry, such as a minister of education who assists in educational programs for different age groups, or a minister of music.

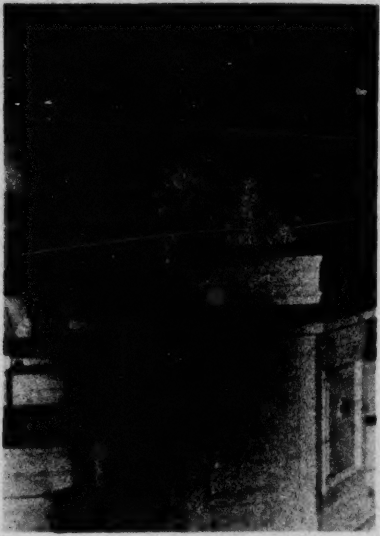
Places of Employment

In 1974, about 185,000 ministers—about 3 percent of them women—served 72 million Protestants. Most ministers serve individual congregations. In addition, however, thousands of ministers were in closely related fields such as chaplains in hospitals and the Armed Forces. The greatest number of clergy are affiliated with the five largest groups of churches—Baptist, United Methodist, Lutheran, Presbyterian, and Episcopal.

All cities and most towns in the United States have at least one Protestant church with a full-time minister. Although the majority of ministers are located in urban areas, many live in less densely populated areas where they may serve two or more congregations.

Training and Other Qualifications

Educational requirements for entry into the Protestant ministry vary greatly. Some denominations have no formal educational require-



ments, and others ordain persons having varying amounts and types of training in Bible colleges, Bible institutes, or liberal arts colleges. A large number of denominations require a 3-year course of professional study in a theological school or seminary following college graduation. A degree of bachelor or master of divinity is awarded upon completion.

In 1974, there were 132 theological institutes accredited by the American Association of Theological Schools. These admit only students who have received a bachelor's degree or its equivalent from an accredited college.

Recommended preseminary courses include English, history, philosophy, the natural sciences, social sciences, the fine arts, music, religion, and foreign languages. However, students considering theological study should contact, at the earliest possible date, the school or schools to which they intend to apply, in order to learn what will best prepare them for the program they expect to enter.

The standard curriculum recommended for accredited theological schools consists of four major types of courses: biblical, historical, theological, and practical. In recent years, greater emphasis has been placed on courses of a practical nature such as psychology, religious education, and administration. Many accredited schools require that students gain experience in church work under the supervision of a faculty member or experienced minister. Some institutions offer master of theology and doctor of theology degrees to students completing 1 year or more of additional study. Scholarships and loans are available for students of theological institutions.

In general, each large denomination has its own school or schools of theology that reflect its particular doctrine, interests, and needs. However, many of these schools are open to students from other denominations. Several interdenominational schools associated with universities give both undergraduate and graduate training covering a wide range of theological points of view.

Persons who have denominational qualifications for the ministry usually are ordained following graduation from a seminary. In denominations that do not require seminary training, clergy are ordained at various appointed times. Men and women entering the clergy often begin their careers as pastors of small congregations or as assistant pastors in large churches.

Employment Outlook

The trend toward merger and unity among denominations, combined with the closing of smaller parishes and the downturn in financial support, has reduced demand for Protestant ministers in recent years. As a result, new graduates of theological schools will face increasing competition in finding positions. The supply-demand situation will vary among denominations and the chance of obtaining employment will depend, in part, on the length of the candidate's formal preparation. Most of the openings for clergy that are expected through the mid-1980's will therefore result from the need to replace those in existing positions who retire, die, or leave the ministry.

Although fewer opportunities may arise for Protestant ministers to serve individual congregations, newly ordained ministers may find work in youth, family relations, and welfare organizations; religious education; on the campus; and as chaplains in the Armed Forces, hospitals, universities, and correctional institutions.

Earnings and Working Conditions

Salaries of Protestant clergy vary substantially, depending on age, experience, education, denomination, size and wealth of congregation, type of community, and geographic location. According to a study by the National Council of Churches of Christ, median salaries for Protestant ministers in 1973 were about $10,500 plus $1,200 in fringe benefits. However, on the average, ministers had to pay over $1,100 out of their own monies for professionally related expenses, particularly travel. Annual vacations average 3 weeks and there is often opportunity for time off.

Because of the wide range of service that the minister provides, he or she may work long or irregular hours, often involving considerable travel.

Sources of Additional Information

Persons who are interested in the Protestant ministry should seek the counsel of a minister or church guidance worker. Additional information is available from many denominational offices. Each theological school can supply information on admission requirements.

RABBIS

(D.O.T. 120.108)

Nature of the Work

Rabbis are the spiritual leaders of their congregations and teachers and interpreters of Jewish law and tradition. They conduct religious services and deliver sermons at services on the Sabbath and on Jewish holidays. Rabbis customarily are available at all times to counsel members of their congregation, other followers of Judaism, and the community at large. Like other clergy, rabbis conduct weddings and funeral services, visit the sick, help the poor, comfort the bereaved, supervise religious education programs, engage in interfaith activities, and involve themselves in community affairs.

Rabbis serving large congregations may spend considerable time in administrative duties, working with their staffs and committees. Large congregations frequently have an associate or assistant rabbi. Many assistant rabbis serve as educational directors.

Rabbis serve either Orthodox, Conservative, or Reform congregations. Regardless of their particular point of view, all Jewish congregations preserve the substance of Jewish religious worship. The congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings, the use of Hebrew as the language of prayer, or the use of music or a choir. The format of the worship service and, therefore, the ritual that the rabbis use may vary even among congregations belonging to the same branch of Judaism.

Rabbis also may write for religious and lay publications, and teach in theological seminaries, colleges, and universities.

Places of Employment

About 4,000 rabbis served over 6 million followers of the Jewish faith in this country in 1974; approximately 1,550 were Orthodox rabbis, 1,350 were Conservative, and 1,100 Reform. Others work as chaplains in the military services, in hospitals and other institutions, or in one of the many Jewish community service agencies. A growing number are employed in colleges and universities as teachers in Jewish Studies programs.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in those States that have large Jewish populations, particularly New York, California, Pennsylvania, New Jersey, Illinois, Massachusetts, Florida, Maryland, and the Washington, D.C. metropolitan area.

Training and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete a prescribed course of study in a seminary. Entrance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated.

Nearly 30 seminaries train Orthodox rabbis in programs of varying lengths. The required course of study to prepare for ordination is usually 3 or 4 years. However, students who are not college graduates may spend a longer period at these seminaries and complete the requirements for the bachelor's degree while pursuing the rabbinic course. Some Orthodox seminaries do not require a college degree to qualify for ordination, although students who qualify usually have completed 4 years of college.

The Hebrew Union College—Jewish Institute of Religion is the official seminary that trains rabbis for the Reform branch of Judaism. It is the only branch that has approved the training and ordination of women as rabbis. The Jewish Theological Seminary of America is the official seminary that trains rabbis for the Conservative branch of Judaism. Both seminaries require the completion of a 4-year college course, as well as earlier preparation in Jewish studies, for admission to the rabbinic program leading to ordination. Normally 5 years of study are required to complete the rabbinic course at the Reform seminary, including 1 year of preparatory study in Jerusalem. Exceptionally well-prepared students can shorten this 5-year period to a minimum of 3 years. A student having a strong background in Jewish studies can complete the course at the Conservative seminary in 4 years; for other enrollees, the course may take as long as 6.

In general, the curriculums of Jewish theological seminaries provide students with a comprehensive knowledge of the Bible, Talmud, Rabbinic literature, Jewish history, theology, and courses in education, pastoral psychology, and public speaking. The Reform seminary places less emphasis on the study of Talmud and Rabbinic literature; it offers, instead, a broad course of study that includes subjects such as human relations and community organization.

Some seminaries grant advanced academic degrees in fields such as Biblical and Talmudic research. All Jewish theological seminaries make scholarships and loans available.

Newly ordained rabbis usually

begin as leaders of small congregations, assistants to experienced rabbis, directors of Hillel Foundations on college campuses, teachers in seminaries and other educational institutions, or chaplains in the Armed Forces. As a rule, the pulpits of large and well established Jewish congregations are filled by experienced rabbis.

Employment Outlook

The demand for Rabbis has declined in recent years because some established congregations have closed and fewer new ones are being formed. As a result, many newly ordained Rabbis will take positions in smaller Jewish communities and as assistant Rabbis in larger Jewish congregations. Opportunities still exist for Rabbis to teach in colleges and universities, to serve as chaplains in the Armed Forces, and to work in hospitals and other institutions or in one of the many Jewish social service agencies. Openings in established congregations will come largely from a need to replace those Rabbis who retire or die.

Earnings and Working Conditions

In 1974, newly ordained Rabbis averaged about $17,000-$18,000 a year in salary and other benefits, including housing, pension, etc. Most established Rabbis earned between $20,000 and $35,000 a year, with some earning as much as $50,000-$60,000. Incomes vary depending on the size and financial status of the congregation, as well as its denominational branch and geographic location. Rabbis usually earn additional income from gifts or fees for officiating at ceremonies such as weddings.

Rabbis' working hours are determined by their role in the congregation. Besides conducting regular religious services, they may also spend considerable time in administrative, educational, and community service functions, as well as presiding over various ceremonial services. Rabbis must also be available to serve the emergency needs of their congregation members.

Sources of Additional Information

Young people who are interested in entering the rabbinate should seek the guidance of a rabbi. Information on the work of a rabbi and occupations allied to it is also available from many of the local Boards of Rabbis in large communities. Each Jewish theological seminary can supply information on its admission requirements.

ROMAN CATHOLIC PRIESTS

(D.O.T. 120.108)

Nature of the Work

Roman Catholic priests attend to the spiritual, pastoral, moral, and educational needs of the members of their church. Their duties include presiding at liturgical functions; offering religious enlightenment in the form of a sermon; hearing confessions; administering the Sacraments, (including the sacraments of Marriage and Penance); and conducting funeral services. They also comfort the sick, console relatives and friends of the dead, counsel those in need of guidance, and assist the poor.

Priests spend long hours working for the church and the community. Their day usually begins with morning meditation and Mass, and may end with the hearing of confessions or an evening visit to a hospital or a home. Many priests direct and serve on church committees, work in civic and charitable organizations, and assist in community projects.

There are two main classifications of priests—diocesan (secular) and religious. Both types have the same powers acquired through ordination by a bishop. The differences lie in their way of life, the type of work to which they are assigned, and the church authority to whom they are immediately subject. Diocesan priests generally work as individuals in parishes assigned to them by the bishop of their diocese. Religious priests generally work as part of a religious order, such as the Jesuits, Dominicans, or Franciscans. They engage in specialized activities such as teaching or missionary work assigned to them by superiors of their order.

Both religious and diocesan priests hold teaching and administrative posts in Catholic seminaries, colleges and universities, and high schools. Priests attached to religious orders staff a large proportion of the institutions of higher education and many high schools, whereas diocesan priests are usually concerned with the parochial schools attached to parish churches and with diocesan high schools. The members of religious orders do most of the missionary work conducted by the Catholic Church in this country and abroad.

Places of Employment

Approximately 57,000 priests

served nearly 49 million Catholics in the United States in 1974. There are priests in nearly every city and town and in many rural communities. The majority are in metropolitan areas, where most Catholics reside. Catholics are concentrated in the Northeast and Great Lakes regions, with smaller concentrations in California, Texas, and Louisiana. Large numbers of priests are located in communities near Catholic educational and other institutions.

Training and Other Qualifications

Preparation for the priesthood generally requires 8 years of study beyond high school. There are almost 400 seminaries offering post-high school education. Preparatory study may begin in the first year of high school, at the college level, or in theological seminaries after college graduation.

High school seminaries provide a college preparatory program that emphasizes English grammar, speech, literature, and social studies. Two years of Latin are required and the study of modern language is encouraged. The seminary college offers a liberal arts program, stressing philosophy and religion; the study of man through the behavioral sciences and history; and the natural sciences and mathematics. In many college seminaries, a student may concentrate in any of these fields.

The remaining 4 years of preparation include sacred scripture; apologetics (the branch of theology concerning the defense and proofs of Christianity); dogmatic, moral, and pastoral theology; homeletics (art of preaching); church history; liturgy (Mass); and canon law. Field work experience is usually required in addition to classroom study. Diocesan and religious priests attend different major seminaries, where slight variations in the training reflect the differences in the type of work expected of them as priests. Priests are not permitted to marry.

Postgraduate work in theology is offered at a number of American Catholic universities or at ecclesiastical universities around the world, mostly in Rome. Also, many priests do graduate work at other universities in fields unrelated to theology. Priests are commanded by the law of the Catholic Church to continue their studies, at least informally, after ordination.

Young men are never denied entry into seminaries because of lack of funds. In seminaries for secular priests, the church authorities may make arrangements for student scholarships or loans. Those in religious seminaries are financed by contributions of benefactors.

The first assignment of a newly ordained secular priest is usually that of assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained. Many opportunities for greater responsibility exist within the church, depending on the talents, interests, and experience of the individual.

Employment Outlook

A growing number of priests will be needed in the years ahead to provide for the spiritual, educational, and social needs of the increasing number of Catholics in the Nation. The number of ordained priests has been insufficient to fill the needs of newly established parishes and other Catholic institutions, and to replace priests who retire or die. This situation is likely to persist. However, some of the duties of priests are being assigned to lay deacons. Although priests usually continue to work longer than persons in other professions, the varied demands and long hours create a need for young priests to assist the older ones. Also, an increasing number of priests have been acting in many diverse areas of service—in social work; religious radio, newspaper, and television work; and labor-management mediation. They also have been serving in foreign posts as missionaries, particularly in countries that have a shortage of priests.

Earnings and Working Conditions

Diocesan priests usually receive a stipend of between $2,000 and $6,000 a year as well as maintenance provisions (room and board, housekeeping, etc.). Religious priests are generally supported by their religious order.

Priests who do special work related to the church, such as teaching, usually receive a partial salary which is less than a lay person in the same position would receive. The difference between the usual salary for these jobs and the salary that the priest receives is called "contributed service." In some of these situations, housing and related expenses may be provided; in other cases, the priest must make his own arrangements. Some priests doing special work may receive the same compensation that a lay person would receive. These may include priests working as lawyers, counselors, consultants, etc.

Due to the wide range of duties which most clergy have, the priest often must work long and irregular hours. His working conditions vary widely with the type and area of assignment.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priest. For information regarding the different religious orders and the secular priesthood, as well as a list of the seminaries which prepare students for the priesthood, contact the diocesan Directors of Vocations through the office of the local pastor or bishop.

OTHER SOCIAL SERVICE OCCUPATIONS

COOPERATIVE EXTENSION SERVICE WORKERS

(D.O.T. 096.128)

Nature of the Work

Extension service workers are engaged with the rural area population in educational work in fields such as agriculture, home economics, youth activities, and community resource development. They are employed jointly by State land-grant universities and the U.S. Department of Agriculture. Extension workers must be proficient in both subject matter and teaching methods.

Extension workers help rural families analyze and solve their farm and home problems and aid in community improvement. Much of this educational work is carried on in groups, through meetings, tours, demonstrations, and use of local volunteer leaders. On problems that cannot be solved satisfactorily by such group methods, extension workers give individual assistance. In their work, they make much use of mass communication media such as newspapers, radio, and television.

County extension workers help farmers produce higher quality crops and livestock more efficiently. They also help them develop new markets and plan production to meet market demands, including those for product quality and variety. They also help community leaders to improve the community, by planning and providing for economic development, recreation, and more adequate public facilities such as schools, water supply and sewer systems, and libraries. They help homemakers to provide more family enjoyment from existing resources, a higher level of nutrition, and a more pleasant home environment. Some extension workers help youths to become more useful citizens and to gain more personal satisfaction through programs in career selection, recreation, health, and leadership. The essence of extension work is to help people help themselves to achieve the goals they think are important.

County extension workers are aided by State Extension Service specialists. The job of these specialists is to keep abreast of the latest research in their particular fields of interest, interpret this for use in extension work, and help county extension workers develop educational programs, activities, and events to use this new knowledge.

Cooperative Extension Services employ persons with a wide range of skills and with specialized training in all phases of crop and livestock production, conservation, environmental improvement, farm management and marketing, family living, human development, nutrition, home management, child development, sociology, psychology, veterinary medicine, engineering, textiles and clothing, resource economics, and business and public administration.

The usual career ladder for extension workers is from assistant county agent to a more responsible job within that county, or in another county in the State, to an assignment on the State Extension Service staff.

Extension workers help farmers produce higher quality crops.

Places of Employment

Extension workers are located in county offices, area offices serving multicounty units, and State offices, the last usually on the campus of the land-grant college or university.

Agents are located in nearly every county in the 50 States, in Puerto Rico, and in the District of Columbia. County staffs range in size from one agent (serving a wide variety of clientele interests) to a dozen or more specialized agents in counties with high population density and great diversity of interests. Staffs are located in counties ranging from the most rural to the most urban.

Training, Other Qualifications, and Advancement

Cooperative Extension Service agents are required to be proficient in disciplines related to the needs and programs of the clientele with whom they work. They must have a bachelor's degree in their subject-matter field; some training in educational techniques is desirable, as well.

Often, they receive training in extension techniques in a pre-induction training program, and are upgraded through regular in-service training programs in both educational techniques and the subject matter for which they are responsible. In addition to subject-matter proficiency, extension workers must like to work with people and to help them.

In most States, specialists and agents assigned to multicounty and State staff jobs are required to have at least one advanced degree and in many they must have a Ph. D.

Employment Outlook

Extension services employ more than 15,600 professional people. The demand for these workers is expected to increase, especially in depressed rural areas. As agricultural technology becomes more complicated, and as farm people become more aware of the need for organized activity, more help will be sought from trained Extension Service personnel. The Extension Service also will reach new segments of the population as residents recognize the value of its assistance, particularly in helping the disadvantaged.

Earnings

The salaries of extension workers vary by locality, but, for the most part, they are competitive with similar jobs in industry and government.

Sources of Additional Information

Additional information is available from County Extension offices, the State Director of the Cooperative Extension Service located at each land-grant university; or the Extension Service, U.S. Department of Agriculture, Washington, D.C. 20250.

HOME ECONOMISTS

(D.O.T. 096.128)

Nature of the Work

Home economists work to improve products, services, and practices that affect the comfort and well-being of the family. Some specialize in specific areas, such as consumer economics, housing, home management, home furnishings and equipment, food and nutrition, clothing and textiles, and child development and family relations. Others have a broad knowledge of the whole professional field.

Most home economists teach. Those in high schools teach students about foods and nutrition; clothing selection, construction and care; child development; consumer education; housing and home furnishings; family relations; and other subjects related to family living and homemaking. They also perform the regular duties of other high school teachers that are described in the statement on Secondary School Teachers elsewere in this book.

Teachers in adult education programs help men and women to increase their understanding of family relations and to improve their homemaking skills. They also conduct training programs on secondary, postsecondary, and adult levels for jobs related to home economics. Special emphasis is given to teaching those who are disadvantaged and handicapped. College teachers may combine teaching and research and often specialize in a particular area of home economics.

Home economists employed by private business firms and trade associations promote the development, use, and care of specific home products. They may do research, test products, and prepare advertisements and instructional materials. They also may prepare and present programs for radio and television; serve as consultants; give lectures and demonstrations before the public; and conduct classes for sales persons and appliance service workers. Some home economists study consumer needs and help manufacturers translate these needs into useful products.

Some home economists conduct research for the Federal Government, State agricultural experiment stations, colleges, universities, and private organizations. The U.S. Department of Agriculture employs the largest group of researchers to do work such as study the buying and spending habits of families in all socioeconomic groups and develop budget guides.

Home economists who work for the Cooperative Extension Service conduct adult education programs for men and women and 4-H Club and other youth programs for girls and boys, in areas such as home

Some home economists work with young children.

management, consumer education, family relations, and nutrition. Extension Service home economists also train and supervise volunteer leaders and paid aides who teach adults and youth. (See statement on Cooperative Extension Service Workers elsewhere in this book.)

Federal, State, and local governments and private agencies employ home economists in social welfare programs to advise and counsel clients on the practical knowledge and skills needed for effective everyday family living. They also may help handicapped homemakers and their families adjust to physical as well as social and emotional limitations by changing the arrangements in the home; finding efficient ways to manage household chores; aiding in the design, selection, and arrangement of equipment; and creating other methods and devices to enable disabled people to function at their highest possible level. Other home economists in welfare agencies supervise or train workers who provide temporary or part-time help to households disrupted by illness.

Home economists in health services provide special help and guidance in home management, consumer education and family economics as these relate to family health and well-being. Activities of home economists working in health programs include the following: making home visits; conducting clinic demonstrations and classes in homemaking skills; counseling in the management of time and resources, including financial aspects; assisting mentally retarded parents in developing their potential skills for child care and home management; working with agencies and community resources; and supervising nutrition and home management aides.

Places of Employment

About 128,000 people worked in home economics professions in 1974. This figure includes 33,000 dietitians and 5,800 Cooperative Extension Service workers who are discussed in separate statements elsewhere in this book.

About 75,000 home economists are teachers, about 50,000 in secondary schools and 7,000 in colleges and universities. More than 15,000 are adult education instructors, some of whom teach part time in secondary schools. Others teach in community colleges, elementary schools, kindergartens, nursery schools, and recreation centers.

More than 5,000 home economists work in private business firms and associations. Several thousand are in research and social welfare programs. A few are self-employed.

Although most home economists are women, men are entering the profession in increasing numbers. Most men specialize in foods and institutional management, although some are in the family relations and child development field, applied arts, consumer education, and other areas.

Training, Other Qualifications, and Advancement

About 360 colleges and universities offer a bachelor's degree in home economics, which qualifies graduates for most entry positions in the field. A master's or doctor's degree is required for college teaching, for certain research and supervisory positions, for work as an extension specialist, and for some jobs in nutrition.

Home economics majors study sciences and liberal arts—particularly social sciences—as well as specialized home economics courses. They may concentrate in a particular area of home economics or in what is called general home economics. Advanced courses in chemistry and nutrition are important for work in foods and nutrition; science and statistics for research work; and journalism for advertising, public relations work, and all other work in the communications field. To teach home economics in high school, students must complete the courses required for a teacher's certificate.

Scholarships, fellowships, and assistantships are available for undergraduate and graduate study. Although colleges and universities offer most of these financial grants, government agencies, research foundations, businesses, and the American Home Economics Association Foundation provide additional funds.

Home economists must be able to work with people of various incomes and cultural backgrounds and should have a capacity for leadership. Poise and an interest in people also are essential for those who deal with the public. The ability to write and speak well is important. Among the subjects recommended for high school students interested in careers in this field are home economics, speech, English, health, mathematics, chemistry, and the social sciences.

Home economists frequently gain experience as teachers and advance to positions in business, extension service work, and teacher education.

Employment Outlook

Home economists, especially those wishing to teach in high schools, will face keen competition for jobs through the mid-1980's. Other areas of home economics also will experience competitive job market conditions as those unable to find teaching jobs look for other positions. However, for those willing to continue their education toward an advanced degree, employment prospects in college and university teaching are expected to be good.

Although employment of home economists is expected to grow more slowly than the average for all occupations, many jobs will become available each year to replace those who die, retire, or leave the field for other reasons. Growth will result from increasing awareness of the contributions that can be made by professionally trained home economists in quality child care, nutrition, housing and furnishings design, consumer education, and ecology. They also will be needed to promote home products, to act as consultants to consumers, and to do research for improvement of home products and services. The Vocational Education Amendments of 1968, which provide funds for consumer and homemaking education at the secondary, postsecondary, and adult levels, and focus on the needs of low-income families, should further stimulate the need for home economists.

Earnings and Working Conditions

Home economics teachers in public schools generally receive the same salaries as other teachers. In 1974, the average starting salary of public school teachers with a bachelor's degree was $7,700, according to a National Education Association survey. Public school teachers with a master's degree received average starting salaries of $8,600. Experienced teachers averaged $11,800. Median salaries of women teaching in colleges and universities in 1974 ranged from $9,700 for instructors to $18,200 for professors.

The Federal Government paid home economists with bachelor's degrees starting salaries of $8,500 and $10,500 in late 1974, depending on their scholastic record. Those with additional education and experience generally earned from $12,800 to $21,800 or more, depending on the type of position and level of responsibility. In late 1974, the Federal Government paid experienced home economists average salaries of $19,100 a year.

Cooperative Extension Service workers on the county level averaged $11,800 while those on the State level averaged $16,400 in 1974. In general, home economists earn about one and one-half times as much as the average for all nonsupervisory workers in private industry, except farming.

Home economists usually work a 40-hour week. Those in teaching and extension service positions, however, frequently work longer hours because they are expected to be available for evening lectures, demonstrations, and other work. Most home economists receive fringe benefits, such as paid vacation, sick leave, retirement pay, and insurance benefits.

Sources of Additional Information

A list of schools granting degrees in home economics and additional information about home economics careers, the types of home economics majors offered in each school granting degrees in home economics, and graduate scholarships are available from:

American Home Economics Association,
2010 Massachusetts Ave. NW.,
Washington, D.C. 20036

RECREATION WORKERS

(D.O.T. 079.128, 159.228, 187.118, 195.168, 195.228)

Nature of the Work

Participation in organized recreation activities has become an integral part of the increasing leisure time enjoyed by many Americans. Recreation workers plan, organize, and direct individual and group recreation activities to help people better enjoy their nonworking hours.

Recreation workers organize and lead social, cultural, and physical education programs at community centers, hospitals, workplaces, camps, and playgrounds for people of various ages and interests. They also manage recreation facilities and study the recreation needs of groups and communities. There are several basic types of recreation workers: recreation directors, supervisors, leaders, and activity specialists.

Recreation directors are responsible for the management and administration of recreation programs. They may evaluate the recreation needs of the population they serve, and plan activities according to these needs. They also hire personnel and prepare an operating budget. Particularly in smaller recreation programs, the director also may directly supervise various activities.

Recreation supervisors may plan recreation activities or assist the director in doing this. They then implement these activities, oversee their operation, and evaluate their success. They supervise the recreation leaders, activity specialists, and maintenance workers, and instruct them in many of the skills required to efficiently run a recreation program.

Recreation leaders work directly with the participants in recreation programs and are responsible for the program's day-to-day operation. They may give instruction in crafts, games, sports, and other activities and keep reports and records relating to these activities. Recreation leaders who give instruction in specialties such as art, music, drama, swimming, or tennis are called *activity specialists*. They often conduct classes and coach teams in the activity in which they specialize. A camp counselor is generally a recreation leader and may also be an activity specialist. Recreation leaders usually work under the direction of a supervisor.

The services of recreation workers are used in many different settings. Recreation personnel employed by local government and voluntary agencies provide leisure-time activities at neighborhood playgrounds and indoor recreation centers. They furnish instruction in the arts, crafts, and in sports. They may supervise recreational activities at correctional institutions and work closely with social workers to organize programs for the young and the aged. School recreation staff organize the leisure-time activities of school-age children during schooldays, weekends, and vacations.

Under the supervision of a camp director, recreation leaders and activity specialists lead and instruct campers in nature-oriented forms of recreation such as swimming, hiking, and horseback riding, as well as arts, crafts, and other sports. Some camps provide campers with specialized instruction in a particular area such as music, drama, gymnastics, or tennis. In resident camps, the staff also must insure that the campers have adequate living conditions.

Recreation personnel in industry and in the Armed Forces organize and direct recreation rooms, athletic programs such as bowling and softball leagues, social functions, and other leisure activities for company employees and service men and women.

Therapeutic recreation is a specialized field within the recreation profession. It provides recreational services to aid in recovery or adjustment to illness, disability, or a specific social problem. Recreation specialists may work with the physically handicapped in a school or rehabilitation center, with mentally ill or retarded persons in a public or private institution, or with juvenile delinquents, older citizens, or disabled veterans. The jobs in this specialty are largely comparable to those for recreation workers in other settings.

Places of Employment

More than 65,000 recreation workers were employed year-round in 1974; nearly one-half of them were women. Government recreation departments employed about one-half, primarily in local recreation departments. Many others worked for schools, commercial recreation establishments like camps or resort hotels, and nonprofit voluntary organizations such as athletic or scouting organizations, churches, and community organizations.

Over two-fifths of all year-round recreation workers are employed part time. Many of these are students who work for local government recreation programs. An additional 100,000 recreation workers were employed for the summer months only, during 1974. Seasonal workers are mostly college students and teachers who work primarily as recreation leaders and camp counselors.

Recreation workers are employed mostly in urban areas where many people must use the same playgrounds and recreation centers. Camp recreation workers, however, often work in rural, less populated areas of the country. Camp recreation workers are employed at resident, day, family, and travel camps. Except for the directors of very large camps and workers at the few camps which remain open year-round, camp recreation workers generally are employed for 2 or 3 months only during the summer.

Training, Other Qualifications, and Advancement

Formal training in a college recreation curriculum is becoming increasingly important for those seeking a career in recreation.

Recreation directors generally should have a bachelor's degree, preferably in recreation, as well as considerable experience. Advanced courses leading to a master's degree often are desirable for persons interested in higher level administrative positions and are usually necessary for teaching at a college or university. Those with a bachelor's degree usually begin as supervisors or recreation leaders, and may advance to a director position.

A high school education is generally the minimum requirement for recreation leaders. However, an associate degree in recreation or a related subject from a community or junior college usually is preferred for both year-round and seasonal employment. In addition, those with college training generally start at a higher salary and have better advancement opportunities. Activity specialists must have specialized training in a particular field, such as art, music, drama, or athletics. In most cases, an associate degree in recreation with a concentration in one of these areas or a bachelor's degree in recreation or one of the arts is necessary for year-round employment. In general, camps prefer those with some college background to work as counselors or activity specialists.

In March 1974, 200 community colleges and 186 4-year colleges and universities had recreation and parks curriculums. In addition, 92 graduate programs were offered. The typical program of recreation study includes courses in communications, natural sciences, the humanities, philosophy, sociology, psychology, drama, and music. Specific courses in recreation include group leadership, program planning and organization, health and safety procedures, outdoor and indoor sports, dance, arts and crafts, and field work in which the student obtains actual recreation leadership experience. Students interested in industrial or other types of commercial recreation may find it desirable to take courses in business administration; those interested in therapeutic recreation should take courses in psychology, health education, and sociology.

Young people planning careers as recreation workers must have the ability to motivate people and be sensitive to their needs. Good health and physical stamina often are required. Activity planning frequently calls for creativity and resourcefulness. Recreation workers should be able to accept responsibility and exercise judgment since they usually work alone. To increase their leadership skills and understanding of people, students should obtain related work experience in high school and college. They may do volunteer, part-time, or summer work in recreation departments, camps, youth-serving organizations, institutions, and community centers.

After a few years experience, recreation leaders or activity specialists may become recreation supervisors. Although promotions to administrative positions may be easier for persons with graduate training, advancement is usually possible through a combination of education and experience.

Employment Outlook

The employment of recreation workers is expected to rise faster than the average for all occupations through the mid-1980's as public pressure for recreation areas results in the creation of many new parks, playgrounds, and national forests. Increased attention to physical fitness by government, educators, and others may produce a rise in public and industrial recreation programs. Longer life and earlier retirements also will increase the demand for recreation programs for retired persons. All of these factors will increase the need for recreation workers and stimulate growth in the occupation.

The level of formal education and amount of related work experience will become increasingly important as more recreation graduates compete for positions. Those with a 2-year degree or less will generally be limited in advancement opportunities. Those with a bachelor's degree should have a favorable employment outlook, with increasing competition during economic slowdowns when recreation employment in both the public and private sectors may be adversely affected. Opportunities for those with a master's or Ph. D. degree should be good in teaching, supervisory, and administrative positions.

Job experience prior to graduation will greatly help a graduate find a position. Applicants with the most related job experience will receive the more responsible and higher paying positions.

Many opportunities will be available for part-time and summer employment as recreation leaders and assistants in local government recreation programs. Many of the summer jobs will be for counselors and activity specialists in camps.

Earnings and Working Conditions

Starting salaries for recreation leaders with a bachelor's degree in State and local governments averaged about $8,000 in 1974, according to a survey by the Public Personnel Association. There was a wide salary range among employers—in general, salaries were highest in the west and lowest in the south. Average earnings for recreation workers are higher than those for nonsupervisory workers in private industry, except in farming. According to the National Recreation and Park Association, recreation workers with a 2-year degree usually started at about $6,500 in 1974; those with a bachelor's degree, about $8,000; with a master's degree, $9,-10,000; with a Ph. D., $11-12,000. A person with at least a bachelor's degree and considerable (5-6 years) experience averaged about $14-15,000. Recreation directors' salaries ranged from $11,000 to more than $20,000 depending on their responsibilities.

Starting salaries for recreation workers in the Federal Government in late 1974 were $8,500 for applicants having a bachelor's degree; $10,500 with a bachelor's degree plus 1 year experience; $12,841 with a bachelor's plus 2 years experience or a master's degree; and $15,481 with a bachelor's plus 3 years experience or a Ph. D.

The average week for recreation personnel is 35-40 hours. Many camp recreation workers live at the camps where they work, and their room and board is included in their salaries. Most public and private recreation agencies provide from 2 to 4 weeks vacation and other fringe benefits such as sick leave and hospital insurance.

A person entering the recreation field should expect some night work and irregular hours since they often work while others are enjoying leisure time. Recreation workers often spend much of their time outdoors when the weather permits.

Sources of Additional Information

Information about recreation as a career, employment opportunities in the field, and colleges and universities offering recreation curriculums is available from:

National Industrial Recreation Association,
20 North Wacker Dr., Chicago, Ill. 60606.

National Recreation and Parks Association,
1601 North Kent St., Arlington, Va. 22209.

For information on careers in camping and job referrals, contact:

American Camping Association, Bradford
Woods, Martinsville, Ind. 46151.

SOCIAL WORKERS

(D.O.T. 195.108, .118, .168, and .208, .228)

Nature of the Work

The ability of people to live effectively in society is often hampered by problems that range from personal ones to those arising from social unrest within a group or community. These problems, aggravated by the growing complexity of society, have greatly increased the need for social services. Social workers assist individuals, families, groups and communities in using these services to solve their problems.

The three basic approaches to social work are casework, group work, and community organization. The approach chosen is usually determined by the nature of the problem and the time and resources available for solving it. Social workers often combine these approaches in dealing with a specific problem.

In casework, social workers use interviews to identify the problems of individuals and families. They then help people to understand and solve their problems and to secure needed services, education, or job training. In group work, social workers help people to understand both themselves and others better, to overcome racial and cultural prejudices, and to work together with others in achieving a common goal. They plan and conduct group activities for children, adolescents, older persons and other adults in a variety of settings such as settlement houses, hospitals, homes for the aged, and correctional institutions. In community organization, social workers coodinate the efforts of groups, such as political, civic, religious, business, and union organizations, to combat social problems through community programs. For a neighborhood or larger area, they may help plan and develop health, housing, welfare, and recreation services. They often coordinate existing social services and organize fund raising for community social welfare activities.

The majority of social workers provide social services directly to individuals, families, or groups. However, a substantial number are executives, administrators, or supervisors. Others are college teachers, research workers, consultants, or private practitioners.

Social workers can apply their training and experience in a variety of social service settings.

Social workers in family service positions in State and local government offices and voluntary agencies provide counseling and social services that strengthen personal relationships and help clients to improve their social functioning. They also advise their clients on the constructive use of financial assistance and other social services.

Social workers in child welfare positions work to improve the physical and emotional well-being of deprived and troubled children and youth. They may advise parents on child care and child rearing, counsel children and youth with social adjustment difficulties, arrange homemaker services during a parent's illness, institute legal action for the protection of neglected or mistreated children, provide services to unmarried parents, and counsel couples who wish to adopt children. After making appropriate case evaluations and home studies, they may place children in suitable adoption or foster homes or in specialized institutions.

School social workers aid children whose unsatisfactory school progress is related to their social problems. These workers consult and work with parents, teachers, counselors, and other school personnel to identify and solve problems that hinder satisfactory adjustment.

Social workers in medical and psychiatric settings such as hospitals, clinics, mental health agencies, rehabilitation centers, and public welfare agencies aid patients and their families with social problems accompanying illness, recovery, and rehabilitation. As members of medical teams, they help patients respond to treatment and guide them in their readjustment to their homes, jobs, and communities. (The related occupation of rehabilitation counselor is discussed in a separate section.)

Probation and parole officers and other social workers engaged in correctional programs help offenders and persons on probation and parole readjust to society. They counsel on social problems encountered in relation to their return to family and community life. Probation and parole officers also may help secure necessary education, training, employment, or community services.

In addition, the services of social workers are being sought in many fields where they have not been used significantly in the past. These include private practice (as counselors), industrial social work, drug and alcohol abuse counseling, and city and social policy planning.

Places of Employment

About 300,000 social workers were employed in 1974; nearly two-thirds of them were women. State, county, and city government agencies employ about two-thirds of all social workers; about 3,000 work for the Federal Government. Most of the remainder work for voluntary or private agencies, schools, hospitals, and other medical establishments. Although employment is concentrated in urban areas, many work with rural families. A small number of social workers—employed by the Federal Government and the United Nations or one of its affiliated agencies—serve in other parts of the world as consultants, teachers, or technicians and establish agencies, schools, or assistance programs.

Training, Other Qualifications, and Advancement

In recent years, there has been a growing acceptance of the bachelor's degree in social work (BSW), rather than the master's degree (MSW), as the minimum education of the professional social worker. The BSW programs generally offer an introduction to the social welfare system, the skills and values of social work, and supervised field experience. Although the BSW is preferred, many employers will accept a bachelor's degree in another field as an acceptable level of education.

For many positions, a master's degree in social work is preferred or required. Two years of specialized study and supervised field instruction are generally required to earn an MSW. Previous training in social work is not required for entry into a graduate program, but courses in related fields such as psychology, sociology, economics, political science, history, and social anthropology, as well as social work, are recommended. Some graduate schools recently have established 1-year MSW programs for well-qualified BSW recipients. In 1974, 86 colleges and universities offered accredited graduate programs in social work.

Scholarships and fellowships are available for graduate education. Some social welfare agencies, both voluntary and public, offer plans whereby workers are granted 'educational leave' to obtain graduate education. The agency may pay the expenses or a salary, or both.

A graduate degree and experience are generally required for supervisory, administrative, or research work, the last also requiring training in social science research methods. For teaching positions, an MSW is required and a doctorate usually is preferred. In most State and many local government agencies, applicants for employment must pass a written exam, particularly at the bachelor's level.

At the end of 1974, 14 States had licensing or registration laws providing for the use of professional social work titles by those who qualify. Usually work experience, an examination, or both, are necessary for licensing or registration, with periodic renewal required. The National Association of Social Workers allows the use of the title ACSW (Academy of Certified Social Workers) for those members having at least 2 years of post-master's job experience who have passed the ACSW examination.

Social workers should be emotionally mature, objective, and sensitive and should possess a basic concern for people and their problems. They must be able to handle responsibility, work independently, and form and sustain good working relationships with clients and co-workers.

Students should obtain as much related work experience as possible during high school and college to determine whether they have the interest and capacity for professional social work. They may do volunteer, part-time, or summer work in places such as camps, settlement houses, hospitals, community centers, or social welfare agencies. Some voluntary and public social welfare agencies hire students for jobs in which they assist social workers.

Employment Outlook

Employment opportunities for persons having bachelor's degrees in social welfare or related fields should be favorable through the remainder of the 1970's and into the 1980's. The outlook for graduates of master's degree programs in social work is expected to continue to be good through the mid-1980's. However, if the number of students graduating from social work programs continue to increase at the same rate as in the 1960's and early 1970's, competition for some positions will become stronger. At both the bachelor's and master's levels, it is possible that in certain geographic areas there will be greater job competition.

Employment of social workers is expected to increase faster than the average for all occupations through the mid-1980's. Many new positions will come from the expansion of community mental health centers, and growth of the newer social work services such as drug and alcohol abuse counseling and city and policy planning. Also, as the occupational structure of the economy continues to change, problems may be created for unskilled and displaced workers. This, coupled with the problems caused by social change, is expected to maintain a strong demand for persons in the social service field.

Earnings and Working Conditions

Salaries for social workers at all levels vary greatly by type of agency (private or public, Federal, State, or local) and geographic region. Salaries are generally highest in large cities and in States with sizable urban populations. In 1974, social workers with a bachelor's degree usually started at about $8,000-$8,500; with a master's degree, between $9,500 and $11,000. Salaries for experienced MSW social workers averaged $12,000-15,000 a year. Private practitioners and those in administration, teaching, and research often earn considerably more.

In the Federal Government, social workers with an MSW and no experience usually started at about $10,500 in late 1974. Graduates with an MSW and no work experience may start at $12,800 if they are well qualified for the position; with an MSW and 1 year of experience, usually at $12,800; with an MSW and 2 years of experience, at almost $15,500.

Men and women without graduate training in social work are generally limited in the advancement opportunities available to them, since most supervisory and administrative positions are staffed by master's degree recipients.

Most social workers have a 5-day, 35-40-hour week. However, many, particularly in private agencies, work part time. In some agencies, the nature of the duties requires some evening and weekend work, for which compensatory time off is given. Most social work agencies provide fringe benefits such as paid vacation, sick leave, and retirement plans.

Sources of Additional Information

For information about career opportunities in the various fields of social work, contact:

National Association of Social Workers,
15th and H St. NW., 600 Southern Building, Washington, D.C. 20005.

Information on accredited graduate and undergraduate college programs in social work is available from:

Council on Social Work Education, 345 East
46th St., New York, N.Y. 10017.

ART, DESIGN, AND COMMUNICATIONS RELATED OCCUPATIONS

PERFORMING ARTISTS

The performing arts include music, acting, singing, and the dance. In these fields, the number of talented persons seeking employment generally greatly exceeds the number of full-time positions available. As a result, many performers supplement their incomes by teaching, and others work much of the time in different types of occupations.

The difficulty of earning a living as a performer is one fact young persons should remember when they consider such a career. They should consider, therefore, the possible advantages of making their art a hobby rather than a profession. Aspiring young artists usually must spend many years in intensive training and practice before they are ready for public performances. They not only need great natural talent but also determination, a willingness to work long and hard, and an overwhelming interest in their chosen field, and some luck.

The statements which follow this introduction give detailed information on musicians, singers, actors, and dancers.

ACTORS AND ACTRESSES

(D.O.T. 150.028 and 150.048)

Nature of the Work

Making a character come to life before an audience is a job that has great glamour and fascination. This demanding work requires special talent and involves many difficulties and uncertanties.

Only a few actors and actresses achieve recognition as stars on the stage, in motion pictures, or on television or radio. A somewhat larger number are well-known, experienced performers, who frequently are cast in supporting roles. However, most actors and actresses struggle for a toehold in the profession, and are glad to pick up parts wherever they can.

New actors generally start in "bit" parts where they speak only a few lines. If successful, they may progress to larger, supporting roles, of which there are several in most stage, television, and screen productions. They also may serve as understudies for the principals.

Actors who prepare for stage, screen, and television roles rehearse many hours. They must memorize their lines and know their cues.

In addition to the actors and actresses with speaking parts, "extras," who have no lines to deliver, are used in various ways in almost all motion pictures and many television shows and theatre productions. In "spectacular" productions, a large number of extras take part in crowd scenes.

Some actors find alternative jobs as coaches of drama or directors of stage, television, radio, or motion pictures productions. A few teach in drama departments of colleges and universities.

Places of Employment

About 10,000 actors and actresses work in stage plays, motion pictures (including films made especially for television), industrial shows and commercials.

In the winter, most employment opportunities on the stage are in New York and other large cities. About 400 actors and actresses worked on Broadway in 1974. In the summer, stock companies in suburban and resort areas provide employment. In addition, many cities now have—"little theatres," repertory companies and dinner theatres, which provide opportunities for local talent as well as for professional actors and actresses. Normally plays are produced and casts selected in New York City for shows that go "on the road."

Employment in motion pictures and film television is essentially centered in Hollywood and New York City, although a few studios are located in Miami and other parts of the country. In addition, many films are shot on location, and employ local nonprofessionals as "extras." A number of American-produced films are being shot in foreign countries. In television, most opportunities for actors are at the headquarters of the major networks—in New York, Los Angeles, and, to a lesser extent, Chicago. A few local television stations occasionally employ actors.

Training, and Other Qualifications

Young persons who aspire to acting careers should take part in high school and college plays, or work with little theatres and other acting groups for experience.

Formal training in acting which is increasingly necessary, can be obtained at dramatic art schools, located chiefly in New York, and in more than 1,600 colleges and universities throughout the country. College drama curriculums usually include courses in liberal arts, speech, pantomime, directing, playwriting, play production, and history of the drama, as well as practical courses in acting. From these, the student develops an appreciation of the great plays and a greater understanding of the roles he may be called on to play. Graduate degrees in fine arts or drama are needed for college teaching positions.

Acting demands patience and total commitment, since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and often do much traveling. Flawless performances require long rehearsal schedules and the tedious memorizing of lines. The actor needs stamina to withstand the heat of stage or studio lights, or the adverse weather conditions which may exist "on location." Above all, young persons who plan to pursue an acting career must have talent and the creative ability to portray different characters. They must have poise, stage presence, and aggressiveness to project themselves to the audience. At the same time, the ability to follow directions is important.

In all media, the best way to start is to use local opportunities and to build on the basis of such experience. Many actors successful in local productions eventually try to appear on the New York stage. Inexperienced actors find it extremely difficult to obtain employment in New York or Hollywood particularly in the motion picture field where employment often results from previous experience on Broadway.

To become a movie extra, one must usually be listed by Central Casting, a no-fee agency which works with the Screen Extras Guild and supplies all extras to the major movie studios in Hollywood. Applicants are accepted only when the number of persons of a particular type on the list—for example, athletic young men, old ladies, or small children—is below the foreseeable need. In recent years, only a very small proportion of the total number of applicants have succeeded in being listed. Extras have very little opportunity to advance to speaking roles.

The length of an actor's or actresses' working life depends largely on skill and versatility. Great actors and actresses can work almost indefinitely. On the other hand, employment becomes increasingly limited by middle age, especially for those who become typed in romantic, youthful roles. Due to the factors disccussed, persons who intend to pursue an acting career may find unstable employment conditions and financial pressures.

Employment Outlook

Overcrowding has existed in the acting field for many years and this condition is expected to persist. In the legitimate theater, motion pictures, radio, and television, job applicants greatly exceed the jobs available. Moreover, many actors are employed in their profession for only a part of the year.

Motion pictures and TV have greatly reduced employment opportunities for actors in the theater. Although a motion picture production may use a very large number of actors, during filming, films are widely distributed and may be used for years. Also, some American-produced films are shot in foreign countries resulting in reduced employment opportunites for American actors and actresses. Television employs a large number of actors on TV programs and commercials. However, employment on this media has been reduced by the FCC ruling that decreased major TV network prime time programming. Local stations often substitute with low cost game shows that employ few actors or reruns. Also, the trend toward 1 to 2-hour programs, and more reruns shortens the period of employment and reduces the number of persons needed.

One possibility for future growth in the legitimate theater lies in the establishment of year-round professional acting companies in cities. The number of such acting groups is growing. The recent growth of summer and winter stock companies, outdoor and regional theatre, repertory companies, and dinner theaters also has increased employment opportunities. Dinner theatres represent the fastest growing area of employment in the country for actors. Also, a possible growth in "Off-Broadway" theatre could result from the recent seating capacity expansion. In addition, some increases may be likely in the employment of actors on television in response to expansion of the Public Broadcasting System, UHF stations, and cable TV. The development and wider use of video cassettes also may result in some employment opportunities. These media will have a positive influence on employment if original material and programs result, not reruns or old movies.

Though the field of acting as a whole is expected to grow faster than the average for all occupations, through the mid-1980's, the number of persons who want to enter the profession is expected to be greater than employment opportunities. Even highly talented young people are likely to face stiff competition and economic difficulties.

Earnings and Working Conditions

Actors and actresses in the legitimate theater belong to the Actors' Equity Association, in motion pictures, including television films, to the Screen Actors Guild, Inc., or to the Screen Extras Guild, Inc., in television or radio, to the American Federation of Television and Radio Artists (AFTRA). These unions and the show producers sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also signs a separate contract which may provide for higher salaries than those specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about $245 in 1974. Those in small "off-Broadway" theaters received a minimum of $137.50 to $210 a week depending on the theater's gross receipts. For shows on the road, the minimum rate was about $347.50 a week. (All minimum salaries are adjusted upward automatically, by union contract, commensurate with increases in the cost of living as reflected in the Bureau of Labor Statistics Consumer Price Index.)

In 1974, motion picture and television actors and actresses earned a minimum daily rate of $172.50, or $604 for a 5-day week. For extras, the minimum rate was $46 a day. Actors and actresses who did not work on prime time network television received a minimum program fee of about $203.50 for a single half-hour program and 8 hours of rehearsal time. Because of the frequent periods of unemployment, characteristic of this profession, annual earnings may be low for many lesser-known performers. According to a recent survey by the Screen Actors Guild, three-quarters of their members earned less than $3,500 a year; only 3 percent earned more than $25,000 a year. In all fields, many well-known actors and actresses have salary rates above the minimums. Salaries of the few top stars are many times the figures cited.

Eight performances amount to a week's work on the legitimate stage, and any additional performances are paid for as overtime. After the show opens, the basic workweek is 36 hours, including 12 hours for rehearsals. Before it opens, however, the workweek usually is longer to allow time for rehearsals. Evening work is, of course, a regular part of a stage actor's life. Rehearsals may be held late at night and on weekends and holidays. When plays are on the road, weekend traveling often is necessary.

Most actors are covered by a pension fund and a growing number have hospitalization insurance to which employers contribute. All Equity and AFTRA members have paid vacations and sick leave. Most stage actors get little if any unemployment compensation solely from acting since they seldom have enough employment in any State to meet the eligibility requirements. Consequently, when a show closes, and while waiting for another role they often have to take any casual work obtainable.

Sources of Additional Information

Information on colleges and universities and conservatories which offer a major in drama is available from:

American Educational Theater Association,
1317 F St. NW., Washington, D.C. 20004.

DANCERS

(D.O.T. 151.028 and 151.048)

Nature of the Work

Dancing is an ancient and worldwide art that has many different forms. Professional dancers may perform in classical ballet or modern dance, in dance adaptations for musical shows, in folk dances, and in other popular kinds of dancing. In classical ballet, movements are based on certain conventional or styled "positions," and women dance "en point" (on the tips of their toes). In modern dance, movements are more varied but are nonetheless carefully planned and executed to follow a pattern.

In dance productions, performers most often work as a corps de ballet (chorus). However, a group of selected dancers may do special numbers, and a very few top artists do solo work.

Many dancers combine stage work with full-time teaching. The few dancers who become choreographers create new ballet or dance routines. Others are dance directors who train dancers in new productions.

(This section does not include instructors of ballroom, American or international folk dance and other social dancing.)

Places of Employment

About 7,000 dancers worked on the stage, screen, and television in 1974. Many more teach at schools

of the dance and in other schools and colleges and universities. A few teachers, trained in dance therapy, work in mental hospitals. About 85 percent of all dancers are women, but in some types of dance, particularly ballet and modern, women constitute only about one-half of the performers.

Dance teachers are located chiefly in large cities, but many smaller cities and towns have schools of the dance. New York City is the hub for performing dancers.

Training and Other Qualifications

Serious training for a career in dancing traditionally begins by age 12 or earlier. For example, persons who wish to become ballet dancers should begin taking lessons at the age of 7 or 8. Two to 3 years of prior preparation is needed before the young girl should start dancing "enpointe." Ballet training requires from 10 to 12 lessons a week for 11 or 12 months in the year and many additional hours of practice. The length of the training period depends on the student's ability and physical development, but most dancers have their professional audition by age 17 or 18. Early and intense training is also important for the modern dancer.

The selection of a professional dancing school is important for (1) setting the pace of training, since too early and too severe exercise can permanently damage the legs and feet; and (2) for connections with producers may help the students obtain employment.

Because of the strenuous training a student's general education may not exceed the minimum. However, a dancer should study music, literature, and history along with the arts to help in the interpretation of dramatic episodes and music. Also, more dancers are being trained in all forms of dance—ballet, ethnic, modern, and tap—for work on the professional stage or education.

About 200 colleges and universities confer bachelor's degrees on students who have majored in physical education and concentrated on the dance; majored in a dance; or majored in a dance program to prepare students as professional dance artists. Some schools also give graduate degrees.

A college education is an advantage in obtaining employment as a teacher of professional dancing or choreography. However, ballet dancers who postpone their first audition for openings in classical ballet until graduation may compete at a disadvantage with younger dancers.

Professional schools usually require teachers to have experience as a performer; colleges and conservatories generally require graduate degrees, but experience as a performer often may be substituted. Maturity and a broad educational background also are important.

The dancer's life is one of rigorous practice and self-discipline. Good health and physical stamina are necessary, both to keep in good condition and to follow the rugged travel schedule often required.

Body height and build should not vary much from the average. Good feet and normal arches also are required. Above all, one must have a natural aptitude for dancing, and a creative ability to express oneself through dance.

Seldom does a dancer perform unaccompanied. Therefore, young persons who consider dancing as a career should be able to function as part of a team. They also should be prepared to face the anxiety of unstable working conditions brought on by show closings and audition failures.

Except for outstanding stars, women past 30 are rarely hired by ballet companies, and women past 25 are rarely hired for Broadway shows unless they have had experience in such productions. Men in ballet and men and women in modern dance can usually work longer than other dancers. After the employable age for performers has passed, some dancers teach in colleges or conservatories or establish their own schools. The few who become choreographers or dance directors can continue to work as long as persons in other occupations.

Employment Outlook

The number seeking professional careers in dance will continue to exceed available positions, despite an expected faster than the average rate of growth in the employment of dancers.

Most openings in this relatively small occupation will result from replacement needs, and competition is expected to be keen. The best employment opportunities will be in teaching dance. Opportunities in stage production will be limited.

The number of stage productions is expected to decline due to increased competition from television and motion pictures, however, some jobs will be available in these media. Financial difficulties of domestic companies and competition from foreign dancers will reduce ballet employment. However, some performing dancers will find jobs in industrial exhibitions, art shows and state fairs. Others will work with new professional dance companies formed from the increasing number of civic and community dance groups.

Earnings and Working Conditions

Professional dancers who perform are members of one of the unions affiliated with the Associated Actors and Artists of America (AFL-CIO). Dancers in opera ballet, classical ballet, and the modern dance belong to the American Guild of Musical Artists, Inc.; those on live or videotaped television belong to the American Federation of Television and Radio Artists; those perform in films, TV, and other forms of motion pictures belong to the Screen Actors Guild or the Screen Extras Guild; and those in musical comedies join Actors' Equity Association. Other dancers may be members of other unions, depending upon the fields in which they perform. The unions and producers sign basic agreements specifying minimum salary rates, hours of work, and other conditions of employment. The separate contract signed by each dancer with the producer of the show may be more favorable than the basic agreement regarding salary, hours of work, and working conditions.

In 1974, the minimum salary for dancers in ballet and other stage productions was about $240 a week. The single performance rate is about $75 for a solo dance and about $40 per dancer for a group. Dancers on tour received an allowance of $30 a day in 1974, to defray the cost of room and board. The employer pays the cost of transportation. For a brief appearance in a performance on television or a few days' work in a movie, the minimum rate is higher, relative to time worked. However, this difference is offset by the brevity of the engagement and the long period likely waiting for the next one. A few performers, of course, have much higher salaries.

Some dancers qualified to teach combine this work with engagements as performers. Many more dancers supplement their incomes by other types of work.

Salaries of ballet teachers vary with the location and prestige of the school. Dance teachers in college and universities are paid on the same basis as other faculty members. (See section on "College and University Teachers.")

The normal workweek is 30 hours (5 hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked. Most stage performances take place, of course, in the evening, and rehearsals require very long hours, often on weekends and holidays. For shows on the road, weekend travel often is required.

Dancers are entitled to some paid sick leave and various health and welfare benefits provided by their unions, to which the employers contribute.

Sources Of Additional Information

Information on colleges and universities and conservatories of music which give a major in the dance or some courses in the dance, as well as details on the types of courses and other pertinent information is available from the National Dance Association, a division of the American Alliance for Health, Physical Education and Recreation, 1201 16th St. NW., Washington, D.C. 20036.

MUSICIANS

(D.O.T. 152.028 and 152.048)

Nature of the Work

Professional musicians—whether they play in a symphony orchestra, dance band, rock group, or jazz combo—generally have behind them many years of formal or informal study and practice. As a rule, musicians specialize in either popular or classical music; only a few play both types professionally.

Musicians who specialize in popular music usually play the trumpet, trombone, clarinet, saxophone, organ, or one of the "rhythm" instruments—the piano, string bass, drums, or guitar. Dance bands play in nightclubs, restaurants, and at special parties. The best known bands, jazz groups, rock groups, and solo performers sometimes give concerts and perform on television.

Classical musicians play in symphonies, opera and theater orchestras, and for other groups that require orchestral accompaniments. Most of these musicians play strings, brass, or woodwinds instruments. Some form small groups—usually a string quartet or a trio—to give concerts of chamber music. Many pianists accompany vocal or instrumental soloists, choral groups or provide background music in restaurants or other places. Most organists play in churches; often they direct the choir.

A few exceptionally brilliant musicians give their own concerts and appear as soloists with symphony orchestras. Both classical and popular musicians make individual and group recordings.

A very high proportion of all musicians teach instrumental and vocal music in schools and colleges. Some direct vocal and instrumental music, teach music appreciation, and give group instruction on an instrument in elementary and secondary school. Many public school teachers and performing musicians, give private lessons in their own studios or in pupil's homes.

A few musicians work in the field of music therapy in hospitals, and in music libraries.

Places of Employment

About 85,000 persons worked as performing musicians in 1974. Many thousands more taught in elementary and secondary schools and in colleges and universities. Almost every town and city has at least one private music teacher.

Most professional musicians who perform work in cities where entertainment and recording activities are concentrated, such as New York, Chicago, Los Angeles, Nashville, Miami Beach, and New Orleans. Many perform with one of the 28 major symphonies, 88 metropolitan, or 1,100 community orchestras. Many communities have orchestras and dance bands,

but in the small towns such work is usually part time.

In addition, thousands of qualified instrumentalists have other full-time jobs and only occasionally work as musicians in dance bands, that are hired to play at private parties or for special occasions. Classical musicians occasionally play in an orchestra, become conductors or composers, or do some part-time teaching.

Training and Other Qualifications

Most people who become professional musicians begin studying an instrument at an early age. To acquire great technical skill, a thorough knowledge of music, and the ability to interpret music, young people need intensive training through private study with an accomplished musician, in a college or university which has a strong music program, or in a conservatory of music. For advanced study in one of these institutions an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

More than 700 conservatories and colleges and universities offer a bachelor's degree program in music education to qualify graduates for the State certificate for elementary and secondary school teaching positions. Over 400 conservatories and collegiate music schools have been accredited by the National Association of Schools of Music to award the degree of bachelor of music to students who major in instrumental or vocal music. These programs provide training in musical performance, history and theory, and some liberal arts courses. College teaching positions, usually require advanced degrees but exceptions may be made for well-qualified artists.

Musicians who play jazz and other popular music must have an understanding of and feeling for that style of music, but classical training may expand their employment opportunities. As a rule, they take lessons with private teachers when young, and seize every opportunity to play in amateur or professional performances. Some young people form small dance bands or rock groups. As they gain experience and become known, they may audition for other local bands, and still later, for the better known bands and orchestras.

Young persons who consider careers in music should have musical talent, creative ability, and poise and stage presence to face large audiences. Since quality of performance requires constant study and practice, self-discipline is vital. Moreover, musicians who do concert and nightclub engagements must have physical stamina because of constant travel and rugged time schedules that often include long night hours.

Employment Outlook

The music performance field is expected to remain keenly competitive through the mid-1980's. Opportunities for concerts and recitals are not numerous enough to provide adequate employment for all the pianists, violinists, and other instrumentalists qualified as concert artists. Competition usually is keen for positions which offer stable employment, such as jobs with major orchestras and teaching positions. Because of the ease with which a musician can enter private music teaching, the number of music teachers has been more than sufficient and probably will continue to be. Although many opprotunities are expected for single and short-term emgagements, playing popular music in night clubs, theaters, and other places, the supply of qualified musicians who seek such jobs is likely to exceed demand. On the other hand, first-class, experienced accompanists and outstanding players of stringed instruments are likely to remain relatively scarce.

Employment of musicians who perform is expected to grow about as fast as the average for all occupations through the mid-1980's. Although the number of civic orchestras in smaller communities has been growing steadily, many provide only part-time employment. The decline in opportunities for musicians in theater, radio, and motion pictures has more than offset these openings. The increased use of recorded music has lead to the decline of opportunities in these areas. Additional employment is expected from the expanded use of TV satellites, cable TV, and wider use of video cassettes.

The employment outlook in music education for people who are qualified as teachers as well as musicians is better than for those qualified as performers only. However, the supply of music teachers in the Nation's schools is adequate—a situation which is likely to continue through the mid-1980's.

Earnings and Working Conditions

The amount received for a performance by either classical or popular musicians depends to a large extent on their professional reputation. Musicians in 1 of the 28 major symphony orchestras in the United States in 1974 received minimum salaries that ranged from about $190 to $350 a week according to the American Symphony Orchestras League, Inc. Eight orchestras—New York, Boston, Philadelphia, Cleveland, Cincinnati, Houston, Chicago, and the National—have year-round seasons (50 weeks or more) and minimum salaries ranging from $10,000 to $18,000. Other major symphony orchestras have seasons ranging from 34 to 52 weeks.

Musicians who played at dances, club dates, water shows, ballets, musical comedies, concerts, and industrial shows earned a minimum of $33 to $40 for 3 hours of work. The minimum scale for recording is $100 for a 15 minute tape (3 hours actual taping time).

Full-time church musicians earned from $7,500 to $16,000 a year—according to hours worked a week and level of training.

The salary schedule for all teachers determines earnings of music teachers in public schools. (See section on Elementary and Secondary School Teachers elsewhere in this book.) Many teachers give private music lessons to supplement their earnings. However, earnings are uncertain and vary according to the musician's reputation, the number of teachers and students in the locality, and the economic status of the community.

Musicians customarily work at night and on weekends. They also must spend considerable time in practice and in rehearsal.

Many musicians, primarily those employed by symphony orchestras, work under master wage agreements, which guarantee a season's work up to 52 weeks. Musicians in other areas, however, may face relatively long periods of unemployment between jobs. Thus, their earnings generally are lower than those of many other occupations. Moreover, they may not work steadily for one employer. Consequently, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay.

Most professional musicians belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American Guild of Musical Artists, Inc. (AFL-CIO).

Sources of Additional Information

For information about wages, hours of work, and working conditions for professional musicians, contact:

American Federation of Musicians (AFL-CIO), 641 Lexington Ave., New York, N.Y. 10022.

Information about the requirements for certification of organists and choir masters is available from:

American Guild of Organists, 630 Fifth Ave., New York, N.Y. 10020.

A list of accredited schools of music is available from:

National Association of Schools of Music, 11250 Roger Bacon Dr., Reston, Va. 22090.

Further information about music teaching in elementary and secondary schools is available from:

Music Educators National Conference, Suite 601, 8150 Leesburg Pike, Vienna, Va. 22180.

SINGERS

(D.O.T. 152.028 and .048)

Nature of the Work

Professional singing is an art that usually requires not only a fine voice but also a highly developed technique and a broad knowledge of music. A small number of singing stars make recordings or go on concert tours in the United States and abroad. Somewhat larger numbers of singers obtain leading or supporting roles in operas and popular music shows, or secure engagements as concert sologists in oratorios and other types of performances. Some singers also become members of opera and musical comedy choruses or other professional choral groups. Popular music singers perform in musical shows of all kinds—in the movies, on the stage, on radio and television, in concerts and in nightclubs and other enterainment places. The best known popular music singers make and sell many recordings.

Since most singers of both classical and popular music have only part-time or irregular employment they often have other jobs and sing only in the evenings or on weekends. Some give private voice lessons. A number of singers teach courses in general music and direct elementary and secondary school choruses. Others give voice training or direct choral groups in churches, in music conservatories or in colleges and universities.

Places of Employment

About 36,000 persons worked as professional singers in 1974. Opportunities for signing engagements are mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas and Chicago—the Nation's chief entertainment centers. Nashville, Tennessee, a major center for country and western music, is one of the most important places for employment of singers for "live" performances and recordings. Singers who teach music in elementary and secondary schools, colleges, universities, and conservation are employed throughout the country. Many work part-time, chiefly as church singers and choir masters.

Training and Other Qualifications

Young persons who want to sing professionally should acquire a broad background in music, including its theory and history. The ability to dance may be helpful, since singers are sometimes required to dance. In addition, those interested in a singing career should start piano lessons at an early age to become familiar with the musical scale and music composition. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. Moreover, because voice training often continues for years after the singer's professional career has started, a prospective singer must have great determination. An audition before a competent voice teacher to decide whether professional training is warranted is also important.

To prepare for careers as singers of classical music young people can enroll in a music conservatory, a school or department of music connected with a college or university, or take private voice lessons. These schools provide voice training, and training in understanding and interpreting music, including music-related training in foreign languages and sometimes dramatic training. After completing 4-years of study, the graduate may receive either the degree of bachelor of music, bachelor of science or arts (in music), or bachelor of fine arts.

Young singers who plan to teach in public schools need at least a bachelor's degree with a major in music education and must meet the State certification requirements for teachers. Over 700 colleges and universities offer such training. Most college teachers must have a master's degree or doctor's degree, but exceptions may be made for well-qualified artists.

Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers. The typical popular song does not demand that the voice be developed to cover as wide a range on the musical scale as does classical music, and the lack of voice projection may be overcome by use of a microphone.

Young singers of popular songs may become known by participating in local amateur and paid shows. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

In addition to musical ability, perseverance and an outstanding personality, a singing career requires an attractive appearance, good contacts, and good luck. Singers also must have physical stamina to adapt to rigorous time and travel schedules which often include working night hours.

Employment Outlook

The employment outlook for singers is expected to remain keenly competitive through the mid-1980's despite an expected faster than the average rate of employment growth. Many short-term jobs are expected in the opera and concert stage, movies, theater, nightclubs, radio and television, dance bands, and other areas—but not enough to provide steady employment for all qualified singers. Singers who can meet State certification requirements may find positions as music teacher.

Recorded music has replaced the "live" singer on radio; television performances by singers are limited. However, the demand is growing for singers who record popular music to do radio and television commercials. Additional employment is expected from the expanded use of TV satellites, cable TV, and wider use of video cassettes.

A singing career is sometimes relatively short, since it depends on a good voice and public acceptance of the artists, both of which may be affected by age. Due to these circumstances and factors discussed elsewhere in the text, singers may be subject to unstable employment conditions and the pressure of unreliable financial circumstances.

Earnings and Working Conditions

Except for a few well-known concert soloists, opera stars, top recording artists of popular music, and some dance band singers. Most professional singers experience difficulty in obtaining regular employment and have to supplement their incomes.

Singers generally work at night and on weekends. Work in the entertainment field is seasonal and few performers have steady jobs.

Singers who appeared in theatrical and TV motion picture productions received a minimum of $187.50 a day or $604 a week in 1974. Singers in opera choruses received $40 per performance. A few opera soloists and popular singers earned thousands of dollars a performance.

Professional singers usually belong to a branch of the AFL-CIO union, the Associated Actors and Artists of America. Singers on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio or live television or make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and nightclub field belong to the American Guild of Variety Artists; those who sing in musical comedy and operettas belong to the Actors' Equity Association; and those who sing in the movies belong to the Screen Actors Guild, Inc.

Sources of Additional Information

Information about accredited schools and departments of music is available from:

National Association of Schools of Music,
11250 Roger Bacon Dr., Reston, Va. 22090.

For information about music teaching in elementary and secondary schools contact:

Music Educators National Conference, Suite
601, 8150 Leesburg Pike, Vienna, Va. 22180.

DESIGN OCCUPATIONS

Good design can improve the appearance and usefulness of the products that we use and the places where we live and work, as well as increase sales by improving their "eye appeal." Making products or places more appealing and functional and bringing them to the attention of the public is the job of people in design occupations.

Many design careers require at least a college education. For example, architects must have at least 5 years of college and professional education. Regardless of the amount of formal training required, people in design occupations should be creative and be able to communicate ideas through their designs and displays.

Job opportunities in design occupations are expected to increase through the mid-1980's, primarily because a growing and more affluent population is becoming more design conscious.

This chapter describes 5 design occupations: architects, commercial artists, industrial designers, interior designers, and landscape architects. (Other jobs that often require design skills—for example, engineers—are described elsewhere in this book.)

ARCHITECTS

(D.O.T. 001.081)

Nature of the Work

Attractive buildings improve the physical environment of a community. But buildings also must be safe and allow people both inside and around them to properly perform their duties. Architects design buildings that successfully combine these elements of attractiveness, safety, and usefulness.

Most architects provide professional services to clients planning a building project. These services begin in the early stages of the project's development and continue until all work is completed.

The architect and client first discuss the purposes, requirements, and cost of a project, as well as any preference on design that the client may have. The architect then prepares a rough drawing to show the scale and structural relationships of the building.

After discussing preliminary drawings with the client, the architect develops a final design showing the floor plans and the structural details of the project. For example, in designing a school, the architect determines the width of corridors and stairways so that students may move easily from one class to another; the type and arrangement of storage space and the location and size of classrooms, laboratories, lunchroom or cafeteria, gymnasium, and administrative offices.

Next the architect prepares working drawings showing the exact dimensions of every part of the structure and the location of plumbing, heating units, electrical outlets, and air conditioning.

Architects also specify the project's building materials, construction equipment, and in, some cases, interior furnishings. In all cases, the architect must insure that the structures' design and specifications conform to local and State building codes, zoning laws, fire regulations, and other ordinances.

After all drawings are completed, the architect assists the client in selecting a contractor and in negotiating the contract. As construction proceeds, there are periodic visits to the building site to insure that the contractor is following the design and using the specified materials. The job is not completed until construction is finished, all required tests are made, and guarantees are received from the contractor.

Architects design a wide variety of structures such as houses, churches, hospitals, office buildings, and airports. They also design multibuilding complexes for urban renewal projects, college campuses, industrial parks, and new towns. Besides designing structures, architects also may help in selecting building sites, in preparing cost and land use studies, and in long range planning for site development.

When working on large projects or for large architectural firms, architects often specialize in one phase of the work such as designing, or administering construction contracts. This often requires working with engineers, urban planners, landscape architects, and other design personnel.

Places of Employment

About 40,000 registered (licensed) architects were employed in 1974. Many unlicensed architectural school graduates also work as architects.

About two-fifths of all architects are self-employed, either practicing individually or as partners. Most of the others work in architectural firms, for builders, for real estate firms, or for other businesses that have large construction programs. Some work for government agencies, often in city and community planning or urban redevelopment. About 1,300 architects work for the Federal Government, mainly for the Departments of Defense, Housing and Urban Development, and the General Services Administration.

Although found in many areas, a large proportion of architects were employed in seven cities: Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, and Washington.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require architects to be licensed. To qualify for the 2-day licensing exam, a person must have

Architects design floor plans for new building.

either a bachelor of architecture degree followed by 3 years of experience in an architect's office or a master of architecture degree followed by 2 years of experience. As a substitute for formal training, most States accept additional experience (usually 12 years) and successful completion of an equivalency test for admission to the licensing examination. Many architectural school graduates work in the field even though they are not licensed. However, a registered architect is required to take legal responsibility for all work.

In 1974, the National Architectural Accrediting Board had accredited 76 of the 100 schools offering professional degrees in architecture. Most of these schools offer a 5-year curriculum leading to a Bachelor of Architecture degree or a 6-year curriculum leading to a Master of Architecture degree. Students may also transfer to professional degree programs after completing a 2-year junior or community college program in architecture. Many architectural schools also offer graduate education for those who already have their first professional degree. Although such training is not essential for practicing architects, it is often desirable for those in research and teaching. A typical college architectural program includes courses in architectural theory, design, graphics, engineering, and urban planning, as well as courses in English, mathematics, chemistry, sociology, economics, and a foreign language.

Persons planning careers in architecture should be able to work independently, have a capacity for solving technical problems, and be artistically inclined. They also must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. Working for architects or building contractors during summer vacations is useful for gaining practical knowledge.

New graduates usually begin as junior drafters in architectural firms, where they make drawings and models of structures under the direction of a registered architect. After several years of experience, they may advance to chief or senior drafters responsible for all major details of a set of working drawings and for supervising other drafters. Others may work as designers, construction contract administrators, or specification writers who prepare directions explaining the architect's plan to the builder. Employees who become associates in their firms receive, in addition to a salary, a share of the profits. Usually, however, the architect's goal is to establish a private practice.

Employment Outlook

Job prospects for architects are expected to be favorable through the mid-1980's. Employment of architects is expected to rise at a much faster rate than the average for all workers during this period. In recent years, the number of degrees granted in architecture also has been increasing rapidly. If this trend continues, the number of people seeking employment in the field should be roughly in balance with the number of openings from growth, deaths, and retirements. The outlook for these workers may change, however, during shortrun periods. Since the demand for architects is highly dependent upon the level of new construction, any significant upsurge or downturn in building could temporarily alter demand.

Most job openings are expected to be in architectural firms but some openings are also expected to occur in colleges and universities, construction firms and the Government as agencies become more involved in environmental design and planning. (See statement on Urban Planners elsewhere in this book.)

The major factor contributing to the increase in employment of architects is the expected rapid growth of nonresidential construction. In addition, the projected increase in enrollments in architectural programs should result in additional requirements for architects to teach in colleges and universities.

Growing public concern about the quality of the physical environment is expected to increase the demand for urban redevelopment and city and community environmental planning projects. This should create further opportunities for employment.

Earnings and Working Conditions

The average salary for architects in 1973 was $23,000 according to the limited information available. Architects with well-established private practices generally earn much more than high-paid salaried employees of architectural firms. Although the range in their incomes is very wide, some architects with many years of experience and good reputations earned well over $35,000 a year. Architects starting their own practices may go through a period when their expenses are greater than their incomes. Annual incomes may fluctuate due to changing business conditions.

Depending on their college records, architects having a bachelor's degree and no experience could start in the Federal Government at either $163 or $202 a week in 1974. Architects who have completed all requirements for the master's degree can start at $247 and those with a Ph. D. at $334 a week.

Most architects spend long hours at the drawing board in well equipped offices. An architect sometimes has to work overtime to meet a deadline. The routine often is varied by interviewing clients or contractors, and discussing the designs, construction procedures, or building materials of a project with other architects or engineers. Contract administrators frequently work outdoors during inspections at construction sites.

Sources of Additional Information

General information about careers in architecture including a catalog of publications can be obtained from:

The American Institute of Architecture,
1735 New York Ave., Washington, D.C. 20036.

Information about schools of architecture and a list of junior colleges offering courses in architecture are available from:

The Association of Collegiate Schools of Architecture, Inc., 1735 New York Ave., Washington, D. C. 20036.

COMMERCIAL ARTISTS

(D.O.T. 141.031 and .081, 970.281 and .381, and 979.381)

Nature of the Work

A team of commercial artists with varying skills and specializations often creates the artwork in newspapers and magazines and on billboards, brochures, catalogs, and television commercials. This team is supervised by an art director, who develops the artistic aspects of an advertising plan, and then turns it over to a layout artist for further refinement. The layout artist who constructs or arranges elements of the advertisement, also selects and lays out illustrations and photographs, plans use of typography, and determines color and other elements of design. Preparation of a "rough visual" or sketch is the next step. The layout artist may change the visual after consulting with the director and complete a more comprehensive layout for the customer.

A variety of specialists work with the layout artist to turn out the finished product. These include *renderers*, who use magic markers to make rough drafts; *letterers*, who execute appropriate lettering either freehand or with mechanical aids; *illustrators*, who sketch and draw in more finished form; and *pasteup* and *mechanical workers*, who cut and paste basic parts of the advertisement or other artwork by using a ruling pen and other drafting tools. Some workers, called *general board workers*, spend nearly all their time at the drawing board performing many of these specializations. Apprentices help general board workers or other specialists by doing routine jobs such as separating colors and cutting mats.

In a small office, the art director may perform the layout and board work with the aid of apprentices. In a large office, the art director develops concepts with the copywriter; sets standards; deals with clients; and purchases needed photographs, illustrations, lettering, and other artwork from freelancers.

Advertising artists create the concept and artwork for a wide variety of items. These include direct mail advertising, catalogs, counter displays, slides, and filmstrips. They also design or lay out the editorial pages and features and produce or purchase the necessary illustrations or artwork. Some commercial artists specialize in producing fashion illustrations, greeting cards, or book illustrations, or in making technical drawings for industry.

Places of Employment

About 64,000 persons, one-third of them women, worked as commercial artists in 1974. Although some commercial artists can be found in nearly every city, the majority work in large cities, such as New York, Los Angeles, Boston, Washington, D.C., and Chicago, where the largest users of commercial art are located.

Most commercial artists work as staff artists for advertising departments of large companies, printing and publishing firms, textile companies, photographic studios, television and motion picture studios, department stores, and a variety of other business organizations. Many are self-employed or freelance artists. Some salaried commercial artists also do freelance work in their spare time. About 2,400 commercial artists work for Federal Government agencies, principally in the Defense Department. A few teach in art schools.

Training, Other Qualifications, and Advancement

Artistic ability, judgment, imagination and a capacity to visualize ideas on paper are important qualifications for success in commercial art. However, these qualities must be developed by specialized training in the techniques of commercial and applied art. Education in the fine arts—painting, sculpture, or architecture—and in academic studies generally provides a good foundation for obtaining employment in commercial art, and may be essential for promotion. Special courses in visualization, typography and production, and TV commercial creation and production also are desirable.

The most widely accepted training for commercial art is the instruction given in art schools or institutes that specialize in commercial and applied art. To enter art school, an applicant must usually have a high school education. Some schools admit only applicants who submit acceptable work samples. The course of study, which may include some academic work, generally takes 2 or 3 years, and a certificate is awarded on graduation. A growing number of art schools, particularly those in or connected with universities, require 4 years or more of study and confer a bachelor's degree—commonly the bachelor of fine arts (B.F.A.). About 300 colleges and universities confer such degrees. In these schools, commercial art instruction is supplemented by liberal art courses, such as English and history. Limited training in commercial art also may be obtained through public vocational high schools and practical experience on the job. However, supplemental training usually is needed for advancement. Beginners also should supplement their formal education and training by experience in doing posters, layouts, illustrations and similar projects for schools and other organizations.

The first year in art school may be devoted primarily to the study of fundamentals—perspective, design, color harmony, composition—and to the use of pencil, crayon, pen and ink, and other art media. Subsequent study, generally more specialized, includes drawing from life, advertising design, graphic design, lettering, typography, illustrations, and other courses in the student's particular field of interest.

The various specialties, however, differ in some of the specific abilities required. For example, letterers and retouchers must do precise and detailed work that requires excellent coordination, whereas illustrators and designers need imagination, a distinctive art style, and, in most cases, the ability to draw well. Some experience with photography, typography, and printing production is useful in art direction or design. Freelance commercial artists must sell both ideas and finished work to clients. A knowledge of type specifications and printing production methods is very helpful. A business sense and responsibility in meeting deadlines are assets, also. Art directors need a strong educational background in art and business practices and the liberal arts. Advertising art directors require a special kind of creativity—the ability to conceive ideas that will stimulate the sale of the client's products or services.

Beginning commercial artists usually need some on-the-job training to qualify for other than strictly routine work. Advancement is based largely on the individual's artistic talent, creative ability, and education. After considerable experience, many salaried commercial artists leave to do freelance work. Most illustrators are freelancers; many of them have an agent.

Commercial artists usually assemble their best artwork into a "portfolio," to display their work. A good portfolio is essential in obtaining initial employment and freelance assignments as well as for job changes.

Employment Outlook

Talented and well-trained commercial artists may face competition for employment and advancement in most kinds of work through the mid-1980's. Those with only average ability and little specialized training probably will encounter keen competition for beginning jobs and have limited opportunities for advancement.

Employment of commercial artists is expected to increase about as fast as the average for all occupations through the mid-1980's. One anticipated area of growth is in visual advertising such as television graphics, packaging displays, and poster and window displays. The expanding field of industrial design also is expected to require more qualified artists to do three-dimensional work with engineering concepts. (See statement on Industrial Designers.) In addition, several thousand jobs for commercial artists are expected to open each year throughout the period to replace workers who will die, retire, or leave the field for other reasons.

The demand for commercial artists is expected to vary by specialization or type. For example, demand for freelance artists is expected to increase; experienced paste-up and mechanical artists are always needed; jobs for designers, art directors, and layout men will be fewer, much sought after and open only to experienced, high talented, and creative artists.

Commercial art occupations are particularly sensitive to changes in business conditions. Therefore, jobseekers may find opportunities in any one year more or less plentiful in accordance to economic conditions.

Earnings and Working Conditions

In 1974, beginning commercial artists having no training beyond vocational high school typically earned from $85 to $90 a week; graduates of 2-year professional schools, $90 to $100 a week; and graduates of 4-year post-high school programs, $100 to $120 a week, according to the limited data available. Talented artists who had strong educational backgrounds and good portfolios, however, started at higher salaries. After a few years of experience, qualified artists may expect to earn $140 to $160 a week or more. Art directors, designers, executives, well-known freelance illustrators, and others in top positions generally have much higher earnings, from $300 to $500 a week or more.

Earnings of freelance artists vary widely, since they are affected by factors such as skill level, variety, and popularity of work. Freelancers receive from $25 for a single black-and-white fashion sketch to $2,000 for a color cover for a national magazine. Freelance artists may be paid by the hour or by the assignment. Commercial artists who worked for the Federal Government in 1974 had an average annual salary of $13,196 or $256 a week.

Salaried commercial artists generally work 35 to 40 hours a week, but sometimes they must work additional hours and under a considerable amount of pressure in order to meet deadlines. Freelance artists usually have irregular working hours.

Sources of Additional Information

Information on institutions offering programs in commercial art is available from:

National Art Education Association, National Education Association, 1916 Association Dr., Reston, Va. 22091.

INDUSTRIAL DESIGNERS

(D.O.T. 142.081)

Nature of the Work

When people buy a product, whether it's a home appliance, a new car, or a ball point pen, they want it to be attractive as well as useful. Industrial designers combine artistic talent with knowledge of marketing, materials, machines, and methods of production to improve the appearance and functional design of products so that they compete favorably with similar goods on the market.

As the first step in their work, industrial designers study the product and competing products to determine possible uses. Then they sketch different designs and consult with engineers, production supervisors, and sales and market research personnel about the practicability and sales appeal of each idea.

After company officials select the most suitable design, the industrial designer or a professional modeler make a model, often of clay so that it can be easily changed. After any necessary revisions, a final or working model is made, usually of the material to be used in the finished product. The approved model is then put into production.

Some industrial designers seek to create favorable public images for companies and for government services such as transportation by developing trademarks or symbols that appear on the firm's product, advertising, brochures, and stationery. Some design containers and packages which both protect and promote their contents. Others prepare small display exhibits or the entire layout for industrial fairs. Some design the interior layout of special purpose commercial buildings such as restaurants and supermarkets.

Industrial designers employed by a manufacturing company usually work only on the products made by their employer. This may involve filling day-to-day design needs of the company or long-range planning of new products. Consultants for more than one industrial firm may plan and design a great variety of products.

Places of Employment

About 10,000 persons—about 10 percent women—were employed as industrial designers in 1974. Most worked for large manufacturing companies designing either consumer or industrial products or for design consulting firms. Others did freelance work, or were on the staffs of architectural and interior design firms.

Industrial design consultants work mainly in large cities, for example, New York, Chicago, Los Angeles, and San Francisco. Those with industrial firms usually work in or near the manufacturing plants of their companies, which often are located in small and medium size cities.

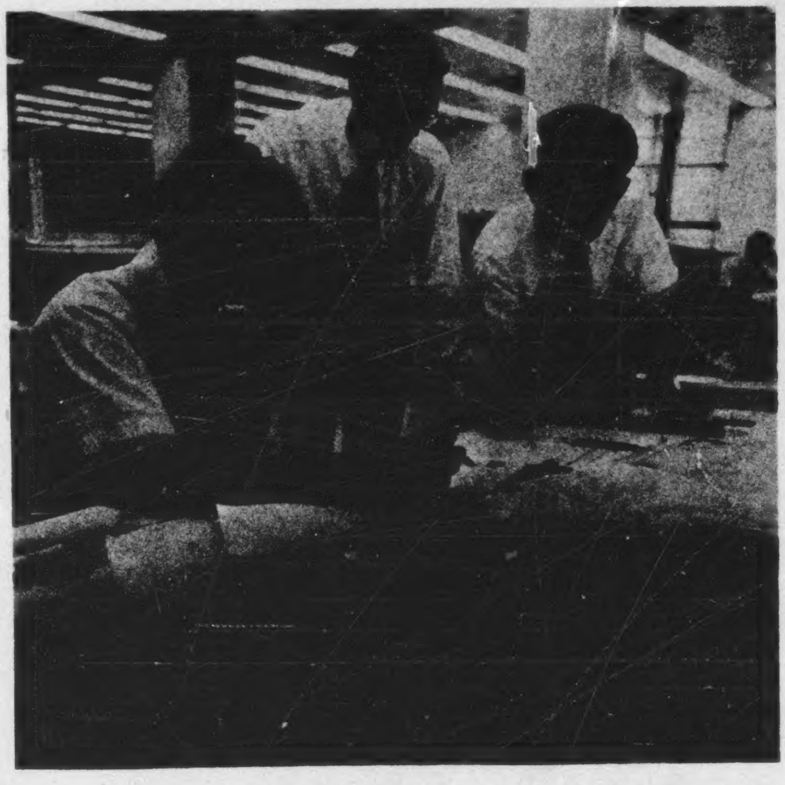
Training, Other Qualifications, and Advancement

Completing a course of study in industrial design in an art school, in the design or art department of a university, or in a technical college is the usual requirement for entering this field of work. Persons majoring in engineering, architecture, and fine arts may qualify as industrial designers if they have appropriate experience and artistic talent. Most large manufacturing firms hire only industrial designers who have a bachelor's degree in the field.

In 1974, 41 colleges and art schools offered programs or courses in industrial design. The Industrial Designers Society of America recognizes 25 of these programs as effective in preparing students for employment as industrial designers.

Industrial design programs usually take 4 years, although a few colleges and universities require 5 years. These schools award a bachelor's degree in industrial design or fine arts; some also award a master's degree. Admittance to most of these schools requires a high school diploma. In some cases, students must present sketches and other examples of their artistic ability.

Industrial design programs differ considerably among schools. Most college and university programs



Industrial designers confer on plans for new product design.

stress the engineering and technical aspects of the field; art schools generally stress a strong background in art. In most programs, students spend much time in the lab designing objects in three dimensions. In studio courses, students make drawings and models with clay, wood, plaster, and other easily worked materials. In schools that have the necessary machinery, students make models of their designs while learning to use metalworking and woodworking machinery. Students also take basic and abstract art and sculpture courses. Some schools require courses in basic engineering and in composition of materials. Courses in business administration and marketing can be helpful in getting a job.

Industrial designers must have creative talent, drawing skills, and the ability to see familiar objects in new ways. They must understand and meet the needs and tastes of the public, rather than design only to suit their own artistic sensitivity. Designers should not be discouraged when their ideas are rejected—often designs must be resubmitted many times before one is accepted. Since industrial designers must cooperate with engineers and other staff members, the ability to work and communicate with others is important. Design consultants should also understand business practices and have sales ability.

Applicants for jobs should assemble a "portfolio" of drawings and sketches to demonstrate their creativity and ability to communicate ideas.

New graduates of industrial design programs frequently assist experienced designers and do simple assignments. As they gain experience, they may become supervisors with major responsibility for the design of a product or a group of products. Those who have an established reputation and the necessary funds may start their own consulting firms.

Employment Outlook

Employment in this relatively small occupation is expected to grow about as fast as the average for all occupations. A growing population and rising incomes will create markets for newly designed products, for improved designs of existing products and packaging and, in turn, for industrial designers who create them. Some employment opportunities also will arise each year as designers die, retire or leave the field.

Employment opportunities are expected to be best for college graduates with degrees in industrial design. Opportunities will also arise for engineering, and architectural school graduates.

Demand for industrial designers may fluctuate over short-run periods. During times of economic downturns when consumer and industrial demand for new products is dampened, requirements for these workers may decline.

Frequent redesign of household products, automobiles, and industrial equipment has always created a need for designers. Although recently the trend has been away from annual style changes, further emphasis on safer products should increase demand for industrial designers since a safer product is usually a better designed product.

Small companies probably will make increasing use of services offered by industrial design consulting firms to compete more effectively with larger firms. However, some of these services, such as trademark and package design, could be offered by advertising agencies.

Earnings and Working Conditions

Salaries for inexperienced industrial designers with a bachelor's degree generally ranged from $9,000 to $12,000 a year in 1974, according to limited data. After several years experience, it is possible to earn $14,000 to $18,000 a year. Salaries of those with many years of experience averaged more than $20,000 a year, but varied according to individual talent and the size and type of firm.

Though earnings of industrial designers who own their consulting firms fluctuate markedly, in recent years most consultants earned between $24,000 and $32,000; heads of large well-known firms earned considerably more.

Sources of Additional Information

A brochure about careers and a list of schools offering courses and degrees in industrial design are available for 50 cents from:

Industrial Designers Society of America,
1750 Old Meadow Rd., McLean, Va. 22101.

INTERIOR DESIGNERS

(D.O.T. 142.051)

Nature of the Work

The creative work of interior designers, sometimes called *interior decorators*, helps make our living, working, and playing areas more attractive and useful. Interior designers plan and supervise the design and arrangement of building interiors and furnishings. They help clients select and estimate the cost of furniture, draperies, other fabrics, floor coverings, and accessories. Interior designers may do "boardwork," particularly on large assignments. Boardwork includes work on floor plans and elevations and preparing sketches or other perspective drawings so clients can visualize their plans. After the client approves both the plans and the cost, the designer may make arrangements for buying the furnishings; for supervising the work of painters, floor finishers, cabinetmakers, carpet layers, and other craft workers; and for installing and arranging the furnishings.

Many large department and furniture stores have separate design departments to advise their customers on decorating and design plans. The designer's principal function in these departments is to help sell the store's merchandise, although materials from outside sources may be used occasionally when they are essential to the customer's plans. Department store designers frequently advise the store's buyers and executives about style and color trends in interior furnishings.

Interior designers may work on private homes or commercial buildings. Those who specialize in commercial structures often work for clients on large design projects such as the interiors of entire office buildings, hospitals, and libraries. Generally they plan the complete layout of rooms without changes to the structure of the building. Sometimes they redesign or renovate the interiors of old buildings. In these cases, an architect must check the plans to assure compliance with building requirements and to solve structural problems. Some interior designers also design the furniture and accessories to be used in various structures, and then arrange for their manufacture. A few have unusual jobs such as designing interiors of ships and aircraft, while others design stage sets used for motion pictures or television.

Places of Employment

About 34,000 persons—half of them men—worked as interior designers in 1974. Most workers in this occupation are employed in large cities.

Some interior designers own their own establishment, either alone or as members of a firm with other designers. Large design firms employ designers who work independently or as assistants to more senior designers.

Interior designers and clients discuss furniture selection.

Other interior designers work in large department or furniture stores, and a few have permanent jobs with hotel and restaurant chains. Some work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, or other manufacturers in the interior furnishing field.

Interior designers work for magazines that feature articles on home furnishings. Some large industrial corporations employ interior designers on a permanent basis.

Training, Other Qualifications, and Advancement

Formal training in interior design is becoming increasingly important for entrance into this field. Most department stores, well-established design firms, and other major employers will accept only professionally trained people for beginning jobs. The types of training available include 3-year programs in a professional school of interior design, 4-year college or university programs which issue a bachelor's degree, or post-graduate programs leading to a master's degree or the Ph. D. The basic course of study usually includes the principles of design, history of art, freehand and mechanical drawing, painting, study of the essentials of architecture as they relate to interiors, design of furniture and exhibitions, and study of various materials, such as woods, plastics, metals, and fabrics. A knowledge of furnishings, art pieces, and antiques is important. In addition, courses in sales, business procedures, and other business subjects are valuable.

Membership in the American

Society of Interior Design is a recognized mark of achievement in this profession. Membership usually requires the completion of 3 or 4 years of post-high school education in design, and several years of practical experience in the field, including supervisory work.

Persons starting in interior design usually serve a training period, either with design firms, in department stores, or in furniture stores. They may act as receptionists, as shoppers with the task of matching materials or finding accessories, or as stockroom assistants, salespersons, assistant decorators, or junior designers. In most instances, from 1 to 5 years of on-the-job training is required before a trainee becomes eligible for advancement to designer. Beginners who do not get trainee jobs often work selling fabric, lamps, or other interior furnishings to gain experience in dealing with customers and to become familiar with the merchandise. This experience may help in obtaining a job in design or may lead to a career in merchandising.

After considerable experience, designers may advance to design department head, interior furnishings coordinator, or to other supervisory positions in department stores or in large design firms. If they have the necessary funds, they may open their own businesses. Exceptionally talented people can advance rapidly.

Artistic talent—color sense, good taste, imagination—good business judgment, and ability to work with detail and to deal with people are important assets for success in this field. An advantage to interior design as a career is the satisfaction of seeing the results of one's work.

Employment Outlook

Persons seeking beginning jobs in interior designing are expected to face competition through the mid-1980's. Interior designing is a competitive field that requires talent, training, and business ability, and many applicants vie for the better jobs. Talented college graduates who major in interior design and graduates of professional schools of interior design will find the best opportunities for employment. Those with less talent or without formal training will find it increasingly difficult to enter this field.

Employment of interior designers is expected to increase about as fast as the average for all occupations through the mid-1980's. Growth in population, personal incomes, expenditures for home and office furnishings, and the increasing use of design services in both homes and commercial establishments should contribute to a greater demand for these workers. In addition to new jobs, some openings will be created by the need to replace designers who die, retire, or leave the field.

Department and furniture stores are expected to employ an increasing number of designers as their share in the growing volume of design work for commercial establishments and public buildings increases. Interior design firms also are expected to continue to expand.

Employment of interior designers, however, is sensitive to changes in general economic conditions because people often forego design services when the economy slows down.

Earnings and Working Conditions

Beginners are usually paid a straight salary plus a small commission. Starting salaries can range from $85 to $125 a week; firms in large metropolitan areas usually pay the higher salaries.

Some experienced interior designers are paid straight salaries, some receive salaries plus commissions based on the value of their sales, while others work entirely on commissions.

Incomes of experienced designers vary greatly. Many persons earn from $6,000 to $12,000 a year, while highly successful designers earn around $25,000 annually. A small number of nationally recognized professionals earn well over $50,000.

The earnings of self-employed designers vary widely depending on the volume of business, their professional prestige, the economic level of their clients, and their own business competence.

Designers' work hours are sometimes long and irregular. Designers usually adjust their work day to suit the needs of their clients, meeting with them during the evenings or on weekends, when necessary.

Sources of Additional Information

For information about careers in interior design and a list of schools offering programs in this field, contact:

American Society of Interior Design, 730 Fifth Ave., New York, N.Y. 10019.

Foundation for Interior Design Education Research, 1750 Old Meadow Rd., McLean, Va. 22101.

LANDSCAPE ARCHITECTS

(D.O.T. 019.081)

Nature of the Work

Everyone enjoys attractively designed private yards, public parks, and commercial areas. Landscape architects design these areas to fit in with people's needs and aesthetic sense.

Landscape architects assist many types of organizations in planning and designing a project from a real estate firm starting a new suburban development to a city constructing an airport or park. They may plan and arrange trees, shrubbery, walkways, open spaces, and other features as well as supervise the necessary grading, construction, and planting.

Landscape architects first consider the nature and purpose of the project, the funds available, and the proposed buildings in planning a site. Next, they study the site itself, mapping features such as the slope of the land and the position of existing buildings and trees. They also observe the sunny parts of the site at different times of the day, soil texture, existing utilities, and many other landscape features. Then, after consulting with the project architect or engineer they draw up plans to develop the site. If the plan is approved, landscape architects prepare working drawings showing all existing and proposed features such as buildings, roads, walkways, terraces, grading, and drainage structures in planted areas. Landscape architects outline in detail the methods of constructing features and draw up lists of building materials. They then may invite landscape contractors to bid for the work.

Although landscape architects help design and supervise a wide variety of projects, some specialize in certain types of projects such as parks and playgrounds, hotels and resorts, shopping centers, or public housing. Still others specialize in services such as regional planning and resource management, feasibility and cost studies, or site construction.

Places of Employment

More than 12,000 persons worked as landscape architects in 1974; less than 5 percent were women. Most landscape architects are self-employed or work for architectural, landscape architectural, or engineering firms. Government agencies concerned with forest management, water impoundment, public housing, city planning, urban renewal, highways, parks, and recreation employed about 40 percent of all landscape architects. The Federal Government employed about 500 landscape architects, mainly in the Departments of Agriculture, Defense, and Interior. Some landscape architects were employed by landscape contractors, and a few taught in colleges and universities.

Training, Other Qualifications, and Advancement

A bachelor's degree in landscape architecture which takes 4 or 5 years is usually the minimum educational requirement for entering the profession. In 1974 the American Society of Landscape Architects accredited 38 of the 66 colleges and universities offering this training.

Entrance requirements for landscape architecture programs vary by college. Some colleges recommend completion of a high school course in mechanical or geometrical drawing, and most schools advise high school students to take courses in art, botany, and more mathematics than the minimum required for college entrance.

College courses include technical subjects such as surveying, landscape construction, sketching, and city planning. Other courses include horticulture and botany as well as English, science, and mathematics. Most college programs also include field trips to view and study examples of landscape architecture.

Twenty-eight States require a license for independent practice of landscape architecture. Admission to the licensing examination usually requires a degree from an accredited school of landscape architecture plus 2 to 4 years of experience. Lengthy apprenticeship training (6-8 years) under an experienced landscape architect may sometimes be substituted for college training.

Persons planning careers in landscape architecture should be interested in art and nature. Self-employed landscape architects also must understand business practices. Working for landscape architects or landscape contractors during summer vacations helps a person understand the practical problems of the profession, and may be helpful in obtaining employment after graduation.

New graduates usually begin as junior drafters, tracing drawings and doing other simple drafting work. After gaining experience, they help prepare specifications and construction details and handle other aspects of project design. After 2 or 3 years they can usually carry a design through all stages of development. Highly qualified landscape architects may become associates in private firms; landscape architects who progress this far, however, often open their own office.

Employment Outlook

Employment of landscape architects is expected to grow at a much faster rate than the average for all occupations through the mid-1980's, resulting in hundreds of new positions each year. Additionally, new entrants will be needed as replacements for landscape architects who retire or die.

A major factor underlying the increased demand for landscape architects is the growing interest in city and regional environmental planning. Metropolitan areas will require landscape architects to develop land for the efficient and safe use of growing populations. Legislation to promote environmental protection could spur demand for landscape architects to participate in planning and designing a growing number of projects, such as transportation systems, outdoor recreation areas, and land reclamation.

Anticipated new construction may also increase demand for landscape architects. However, during slow periods the demand could be limited.

Earnings and Working Conditions

Though earnings fluctuate widely according to the educational background, experience, and size of the firm, landscape architects who own their own practice often earn more than salaried employees with considerable experience.

The Federal Government, in late 1974, paid new graduates with a bachelor's degree annual salaries of $8,500 or $10,520 depending on their qualifications. Those with an advanced degree had a starting salary of $12,841 a year. Landscape architects in the Federal Government averaged $21,000 a year.

Salaried employees both in government and in landscape architectural firms usually work regular hours, although employees in private firms may also work overtime during seasonal rush periods or to meet a deadline. Self-employed persons often work long hours.

Sources of Additional Information

Additional information including a list of colleges and universities offering accredited courses of study in landscape architecture is available from:

American Society of Landscape Architecture, Inc., 1750 Old Meadow Rd., McLean, Va. 22101.

For information on a career as a landscape architect in the Forest Service, write to:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

COMMUNICATIONS-RELATED OCCUPATIONS

Communication is important to people, either individually as citizens, workers, or employers, or collectively in groups, organizations, or government. This section of the book describes four occupations that specialize in communications—interpreters, technical writers, newspaper reporters, and radio and television announcers.

Interpreters and technical writers work as intermediaries translating messages for people to understand: interpreters help people understand languages foreign to them; technical writers help people understand technical information. Newspaper reporters and radio and television announcers inform people about current events and happenings that might interest or affect them. Newspaper reporters gather information on events which they describe, analyze, and interpret in newspapers for rapid dissemination to large numbers of people. Radio and television announcers use electronic communications equipment to tell people of products and services they might obtain, current happenings, and other items of interest.

INTERPRETERS

(D.O.T. 137.268)

Nature of the Work

Interpreters help people of different nations and different cultures overcome language barriers by translating what has been said by one person into a language that can be understood by others.

There are two basic types of interpretation: simultaneous and consecutive. In simultaneous interpretation, the interpreter translates what is being said as the speaker continues to talk. This technique requires speed and fluency, and it is made possible by the use of electronic equipment. Conference interpreters often work in a glass-enclosed booth from which they can see the speaker. While listening through earphones to what is being said, they simultaneously give the translation by speaking into a microphone. People attending the conference who do not understand the language being spoken may listen to an interpreter's translation by simply pushing a button or turning a dial to get the translation in the language they know. Simultaneous interpretation is generally preferred for conferences, and the development of portable equipment has extended its use to other large-scale situations.

Consecutive interpretation also involves oral translation. However, the speaker and the interpreter take turns speaking. A consecutive interpreter must have a good memory and generally needs to take notes of what is said to be certain to give a complete translation. The chief drawback of consecutive interpretation is that the process is time consuming, because the speaker must wait for the translation before proceeding.

Since interpreters are needed whenever people find language a barrier, their work involves a variety of topics and situations. They may be used, for example, to explain to a group of foreign visitors various aspects of American life, such as points of political or social interest, or they may be required to interpret highly technical speeches and discussions for medical or scientific gatherings. They may work at the United Nations, or find themselves in a courtroom or escorting foreign leaders or business people visiting the United States.

Places of Employment

An estimated 150 persons worked full time as interpreters in the United States in 1974. The largest single concentration of interpreters was at the United Nations in New York where over 60 people held full-time posts. Various other international organizations, located primarily in Washington, D.C., also employed regular staff interpreters. Within the Federal Government, the Departments of State and Justice were the major employers of full-time interpreters.

An estimated 450 persons worked as freelance interpreters. Freelance interpreters may work for various employers under short-term contracts. About four-fifths were under contract on a temporary basis to the Department of State and the Agency for International Development to serve as escort interpreters for foreign visitors to the United States. Some of these interpreters worked a great portion of the year; others worked for only a few days. The remainder of the freelance interpreters constituted the freelance conference field. These interpreters provided for both the supplementary needs of the international and Federal agencies and for the periodic, short-term needs of various international conferences that are held in this country. Besides persons who work strictly as interpreters, many others do some interpretation work in the course of their jobs.

About one-half of the Nation's conference interpreters are women; most escort freelance workers, however, are men.

Training, Other Qualifications, and Advancement

A complete command of two languages or more is the usual requirement for becoming an interpreter. Interpreters must instantaneously call to mind words or idioms corresponding to the foreign ones. An extensive working vocabulary and ease in making the transition from one language structure to another are necessary.

Students who want to become interpreters should become fluent in several languages. Interpreters who work at the United Nations, for example, must know at least three of the five official U.N. languages: English, French, Spanish, Russian, and Chinese. Portuguese and, to some extent, Japanese and German are also valuable to interpreters in the United States.

Two schools in the United States offer special programs for interpreter training. Both require foreign language proficiency upon entry. The Georgetown University School of Languages and Linguistics in Washington, D.C. has a 1- or 2-year course of study leading to a Certificate of Proficiency. Applicants to Georgetown University must qualify on the basis of an oral aptitude test and satisfactory performance in a basic first-year college program. The Monterey Institute of Foreign Studies in Monterey, Calif., offers a 2-year program leading to a master's degree in Language and International Studies and a certificate from the Department of Translation and Interpretation. Applicants to the Monterey Institute must have a bachelor's degree with a language major, or its equivalent. Students also must pass a qualifying examination for the Interpreters Certificate Program.

Many individuals may qualify as interpreters principally on the basis of their foreign backgrounds for positions in which extensive experience and a broad education are not as crucial as for other types of interpretation. For example, consecutive interpreters employed by the Immigration and Naturalization Service of the U.S. Department of Justice serve primarily in interpreting legal proceedings, such as hearings for aliens.

Besides being proficient in languages, interpreters are expected to be generally well informed on a broad range of subjects, often including technical subjects such as medicine or scientific or industrial technology. Work as a translator may serve as a useful background in maintaining an up-to-date vocabulary in various specialized or technical areas. The experience of living abroad also is very important for an interpreter.

Although there is no standard requirement for entry into the profession, a university education usually is considered essential.

People interested in becoming interpreters should be articulate speakers and have good hearing. The exacting nature of this profession requires quickness, alertness, and a constant attention to accuracy. Working with all types of people requires good sense, tact, and the emotional stamina to deal with the tensions of the job. It is essential that interpreters maintain confidentiality in their work and that they give honest interpretations.

Advancement in the interpreting field is generally based on satisfactory service. There is some advancement from escort level interpreting to conference level work.

Employment Outlook

Interpreters may face competition for the limited number of openings. Little change is expected in the number of full-time interpreters through the mid-1980's. Most opportunities, therefore, should result from the need to replace workers who die, retire, or leave their jobs for other reasons. Experience has shown that any slight or sporadic increase in the demand for interpreters can be met by the existing pool of freelance workers. Only highly qualified applicants will find favorable employment opportunities.

Qualified interpreters also may find work abroad. For example, the demand for interpreters in Europe, where so many different languages are spoken, is greater than in the United States.

People who have linguistic abilities also may find some employment opportunities as translators. In fact, many interpreters find the ability to do translation work, if not requisite, an occupational asset. Foreign language competence also is important for careers in the fields of foreign service, international business, and language education.

Earnings and Working Conditions

Salaries of interpreters depend upon the type of interpreting done as well as the ability and performance of the individual. The tax-free annual starting salary for conference interpreters at the United Nations was $10,000 in 1974. Outstanding U.N. interpreters could expect to earn more than $20,000. Beginning salaries for interpreters in various other international organizations were about $9,000 a year, according to the limited information available. In addition, international organizations often paid supplementary living and family allowances.

Junior interpreters who worked for the U.S. Department of State received $12,841 a year in late 1974. Starting salaries were somewhat lower for Government interpreters with limited education, experience, or skills.

In the freelance field, interpreters are paid on a daily basis. Conference interpreter salaries ranged from about $110 to $135 a day in late 1974, depending on experience. The U.S. Department of State paid a daily salary of $110.

Freelance escort interpreters received salaries ranging from about $36 to over $56 a day, based on the individual's skill and prior performance. Interpreters on assignment usually could expect to be paid for a 7-day week. Interpreters are paid transportation expenses by the employing agency and also receive an allowance to cover the cost of accommodations, meals, and other expenses incidental to their assignments.

The conditions under which interpreters work vary widely. In freelancing, there is little job security because of demand fluctuations, and the duration of various freelance assignments ranges from a few days for a typical conference to several weeks for some escort assignments. Although the hours interpreters work are not necessarily long, they are often irregular. In some instances, especially for escort freelance workers, a great deal of travel to a wide variety of locations is required.

Sources of Additional Information

Information on the interpreting profession is available from:

The American Association of Language Specialists, 1000 Connecticut Ave. NW., Suite 9, Washington, D.C. 20036.

For information on entry requirements and courses of study at the two schools offering specialized programs for interpreters, contact:

Division of Interpretation and Translation, School of Languages and Linguistics, Georgetown University, Washington, D.C. 20007.

Department of Translation and Interpretation, Monterey Institute of Foreign Studies, P.O. Box 1978, Monterey, Calif. 93940.

Information about employment opportunities is available from:

Language Services Division, U.S. Department of State, Washington, D.C. 20520.

Secretariat Recruitment Service, United Nations, New York, N.Y. 10017.

NEWSPAPER REPORTERS

(D.O.T. 132.268)

Nature of the Work

Newspaper reporters gather information on current events and use it to write stories for publication in daily or weekly newspapers. In covering events, they may interview people, review public records, attend news events, and do research. As a rule, reporters take notes or use electronic recording devices while collecting facts, and write their stories upon return to the office. Sometimes, to meet deadlines, they telephone their information or stories to other staff members known as "rewrite men," who write or transcribe the stories for them.

Large dailies frequently assign some reporters to "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters handle various types of local news, such as a story about a lost child or an obituary of a community leader. Specialized reporters with a background in a particular subject interpret and analyze the news in fields such as medicine, politics, science, education, business, labor, and religion.

Reporters on small newspapers may cover not only all aspects of local news, but also may take photographs, write headlines, lay out pages, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Places of Employment

About 40,000 persons, two-fifths of them women, worked as newspaper reporters in 1974. The majority of reporters work for daily newspapers; others work for weekly papers and press services.

Reporters work in cities and towns of all sizes. Of the 1,775 daily and 7,650 weekly newspapers, the great majority are in medium-sized towns. However, most reporters work in cities, since big city dailies employ many reporters, whereas a smalltown paper generally employs only a few.

Training, Other Qualifications, and Advancement

Most newspapers will consider only applicants who have a college education. Graduate work is increasingly important. Many editors prefer graduates who have a degree in journalism, which usually provides a liberal arts education along with professional journalism training. Some editors consider a liberal arts degree sufficient. Others prefer applicants who have a liberal arts bachelor's degree and a master's degree in journalism. Although talented writers having little or no academic training beyond high school sometimes become reporters on city newspapers, most reporters without college training begin on rural, small-town, or suburban papers. High school courses that are useful include English, journalism, social science, and typing.

Bachelor's degree programs in journalism are available in more than 200 colleges. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Journalism courses include reporting, copyreading, editing, feature writing, history of journalism, law, and the

relation of the press to society.

More than 500 junior colleges offer journalism programs. Twelve to fifteen hours of credit earned is transferable to most 4-year college programs in journalism. A few junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter on a weekly or small daily newspaper. The Armed Forces also provide some training in journalism.

A graduate degree in journalism was offered by more than 75 schools in 1974. About one-fifth of those offer a doctoral degree in mass communications.

Persons who wish to prepare for newspaper work through a liberal arts curriculum should take English courses that include writing, as well as subjects such as sociology, political science, economics, history, psychology, and speech. Ability to read and speak a foreign language is desirable. Those who look forward to becoming technical writers or reporters in a specialized field such as science, should concentrate on course work in their subject matter areas. (See statement on Technical Writers.) Skill in typing is essential because reporters type their own news stories. On small papers, knowledge of news photography also is valuable.

The Newspaper Fund and individual newspapers offer summer internships that provide college students with an opportunity to practice the rudiments of reporting or editing. In addition, more than 2,500 journalism scholarships, fellowships, assistantships, and loans were awarded to college journalism students by universities, newspapers, and professional organizations in 1974.

News reporting involves a great deal of responsibility, since what a reporter writes frequently influences the opinion of the reading public. Reporters should be dedicated to serving the public's need for accurate and impartial news. Although reporters work as part of a team, they have an opportunity for self-expression. Important personal characteristics include a "nose for news," curiosity, persistence, initiative, resourcefulness, an accurate memory, and the physical stamina necessary for an active and often fast-paced life.

Some who compete for full-time reporter jobs find it is helpful to have had experience as a newspaper "stringer"—a part-time reporter who covers the news in a particular area of the community and is paid on the basis of the stories printed. Experience on a high school or college newspaper also is helpful in getting a job.

Many beginners start on weekly or on small daily newspapers where they acquire a broad range of reporting experience. Some college graduates are hired by large city papers as general assignment reporters while a few others start as copy editors. Beginning reporters usually are assigned duties such as reporting on civic and club meetings, summarizing speeches, writing obituaries, interviewing important visitors to the community, and covering police court proceedings. As they gain experience, they may report more important events, cover an assigned "beat," or specialize in a particular field.

Newspaper reporters may advance to reporting for larger papers or press services. Some experienced reporters become columnists, correspondents, editorial writers, editors, or top executives; these positions represent the top of the field and competition for them is keen. Other reporters transfer to related fields such as public relations, writing for magazines, or preparing copy for radio and television news programs.

Employment Outlook

Beginners with exceptional writing talent are expected to find favorable employment opportunities through the mid-1980's. Others, however, will face strong competition for jobs, especially on large city dailies. Employment opportunities for reporters able to handle news about highly specialized scientific or technical subjects are expected to be favorable.

Weekly or daily newspapers located in small towns and suburban areas are expected to continue to offer the most opportunities for beginners entering newspaper reporting. Openings arise on these papers as reporters gain experience and move up to editing positions or transfer to reporting jobs on larger newspapers or to other types of work. Beginning reporters able to help with photography and other specialized aspects of newspaper work and who are acquainted with the community are likely to be given preference in employment on small papers.

In addition to jobs in newspaper reporting, recent college graduates who have journalism training may enter related fields such as advertising, public relations, trade and technical publishing, and radio and television. Good job opportunities also will be found in teaching journalism for those who have professional experience and at least a master's degree.

Although the broad field of mass communication should continue to expand due to rising levels of education; increasing expenditures for newspaper, radio, and television advertising; and a growing number of trade and technical journals, newspapers are not expected to share equally in this growth. As a result, employment of reporters should increase more slowly than the average for all occupations. Most job openings will continue to arise from the need to replace reporters who are promoted to editorial or administrative positions, transfer to other fields of work, retire, or leave the profession for other reasons.

Earnings and Working Conditions

Reporters working for daily newspapers having contracts negotiated by The Newspaper Guild had average starting salaries of $8,750 in late 1974. In general, earnings of newspaper reporters in 1974 were above average earnings received by nonsupervisory workers in private industry, except farming.

Minimum salaries of reporters having 4 or 5 years of experience who worked for daily newspapers with Guild contracts averaged $14,265 in 1974. The minimums ranged from $9,100, paid by the smallest dailies, to more than $22,000 paid by the largest. Many reporters, however, were paid salaries higher than these minimums. Reporters working for national wire services received annual salaries of at least $14,000.

Most newspaper reporters generally work a 5-day, 35- or 40-hour week. Reporters working for morning papers usually start work in the late afternoon and finish at about midnight. Most reporters also receive benefits such as paid vacations, group insurance, and pension plans.

Sources of Additional Information

Information about opportunities for reporters with daily newspapers is available from:

American Newspaper Publishers Association Foundation, P.O. Box 17407, Dulles International Airport, Washington, D.C. 20041.

For information on opportunities in the newspaper field and starting salaries of journalism graduates, as well as a list of journalism scholarships, fellowships, assistantships, and loans available at colleges and universities, write to:

The Newspaper Fund, Inc., Box 300, Princeton, N.J. 08540.

Information on union wage rates is available from:

The Newspaper Guild, Research and Information Department, 1125 15th St. NW., Washington, D.C. 20005.

For general information about careers in journalism contact:

American Council on Education for Journalism, School of Journalism, University of Missouri, Columbia, Mo. 65201.

Association For Education in Journalism, Murphy Hall, University of Minnesota, Minneapolis, Minn. 55455.

The Society of Professional Journalists, Sigma Delta Chi, 35 East Wacker Dr., Chicago, Ill. 60601.

Information on the opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc., 8305 A Shoal Creek Blvd., Austin, Tex. 78758.

Names and locations of daily newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in public libraries and in most large newspaper offices.

RADIO AND TELEVISION ANNOUNCERS

(D.O.T. 159.148)

Nature of the Work

Most radio announcers act as disc jockeys, introducing recorded music, presenting news and commercials, and commenting on other matters of interest to the audience. They may "ad-lib" much of the commentary, working without a detailed script. They also may operate the control board, sell time for commercials, and write commercial and news copy. In large stations, however, other workers handle these jobs.

Announcers employed by television stations and large radio stations usually specialize in particular kinds of announcing such as sports, news or weather. They must be thoroughly familiar with their areas of specialization. If a written script is needed for parts of the program, the announcer may do the research and writing. Announcers frequently participate in community activities. A sportscaster, for example, might be the master of ceremonies at a touchdown club banquet or greet customers at the opening of a new sporting goods store. Some announcers become well-known and highly paid personalities.

Places of Employment

About 19,000 staff announcers were employed full time by commercial radio and television broadcasting stations in 1974. More than 80 percent of them worked in radio broadcasting. The average commercial radio or television station employed three announcers, although larger stations sometimes employed six or more. In addition to staff announcers, several thousand freelance announcers sell their services for individual assignments to networks and stations, or to advertising agencies and other independent producers.

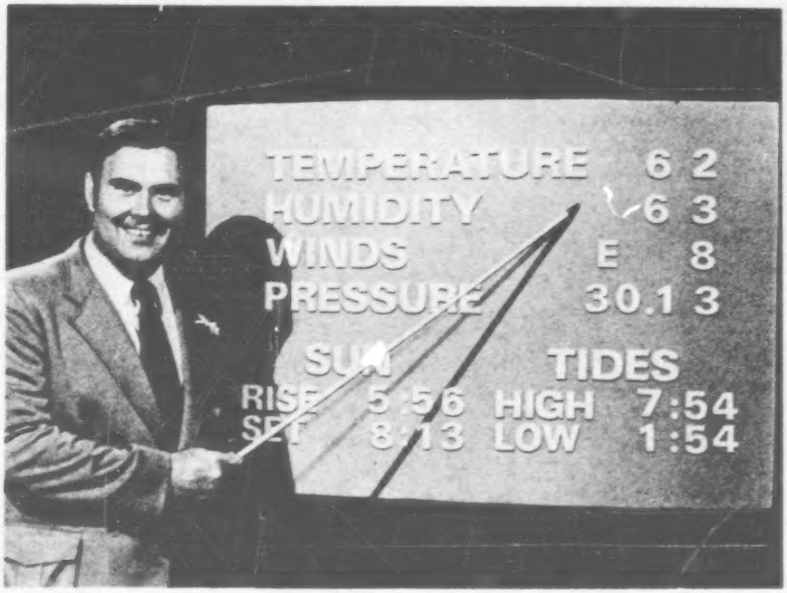
Training, Other Qualifications, and Advancement

Announcers must have a pleasant and well-controlled voice, a good sense of timing, and excellent pronunciation. Correct English usage and a knowledge of dramatics, sports, music, and current events improve chances for success. The most successful announcers have a combination of personality and a knack for dramatization that makes them attractive to audiences.

High school courses in English, public speaking, dramatics, foreign languages, and electronics, plus sports and music hobbies, are valuable background for prospective announcers. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting field. Students at these institutions also may gain valuable experience by supplementing their courses with part-time work at the campus radio station and summer work at local stations, filling in for vacationing staff members. A number of private vocational schools also offer training in announcing. However, those considering training at such a school should contact the personnel managers of stations and broadcasting trade organizations in their area to determine the school's performance in producing suitably trained candidates.

Most announcers get their first broadcasting jobs in small stations. Because announcers in small radio stations sometimes operate transmitters, prospective announcers often obtain an FCC Radiotelephone Third Class Operator License which enables them to operate a radio transmitter and, therefore, makes them much more useful to these stations. (For information on how to obtain a license, see the statement on broadcast technicians elsewhere in this book.)

Announcers usually work in several different stations in the course of their careers. After acquiring experience at a station in a small community, an ambitious and talented announcer may move to a better paying job in a large city. An announcer also may advance by getting a regular program as a disc jockey, sportscaster, or other specialist. In the national networks, competition for jobs is intense, and announcers usually must be college graduates and have several years of successful announcing experience before they are given an audition.



Successful announcers have a personality which makes them attractive to audiences.

Employment Outlook

The employment of announcers is expected to increase about as fast as the average for all occupations through the mid-1980's as new radio and television stations are licensed. Employment growth, however, will be limited by the increased use of automatic programming. Most job openings in this relatively small occupation will result from the need to replace experienced announcers who transfer to other occupations, retire, or die.

It will be easier to get an entry job in radio than in television because of the greater number of radio stations that hire beginners. These jobs generally will be located in small stations, and the pay will be relatively low. A few jobs also will become available as more cable television stations begin their own programming. However, the great attraction of the broadcasting field for young persons, and its relatively small size, will result in keen competition for entry jobs.

Earnings and Working Conditions

Salaries of beginning announcers in commercial television ranged from about $160 to $200 a week in 1974, and those of experienced announcers ranged from about $225 to $350, according to information from union contracts. Many well-known announcers earn much more. As a rule, salaries increase with the size of the community and the station, and salaries in television are higher than those in radio. Announcers employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most announcers in large stations work a 40-hour week and receive overtime pay for work beyond 40 hours. In small stations, many announcers work 4 to 12 hours of overtime each week. Working hours consist of both time on the air and time spent in preparing for broadcasts. Evening, night, weekend, and holiday duty occurs frequently since many stations broadcast 24 hours a day, 7 days a week.

Working conditions are usually pleasant because of the variety of work and the many personal contacts that are part of the job. Announcers also receive some satisfaction from becoming well known in the area their station serves.

Sources of Additional Information

For general career information, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Corporation for Public Broadcasting, 888 16th St. NW., Washington, D.C. 20006.

TECHNICAL WRITERS

(D.O.T. 139.288)

Nature of the Work

Technical writers organize, write, and edit materials about science and technology in order to establish clearer communication between those who develop information—scientists, engineers, and design technicians—and the users of their information—operators, repairers, scientists, engineers, executives, or consumers. Their writing must always be clear and easy to follow, and when it is to be used by specialists it often must include technical detail and a highly specialized vocabulary. Technical writers usually arrange for the preparation of tables, charts, illustrations, and other artwork, and may work with technical illustrators, drafters, or photographers.

Before starting a writing assignment, technical writers usually learn as much as they can about their subject. This process involves studying reports, reading technical journals, and consulting with the engineers, scientists, and other technical personnel who have worked on the project. Then they prepare a rough draft that may be revised several times before it is accepted in final form.

The technical writer's product takes many forms—publicity releases on a company's scientific or technical achievements, manufacturers' contract proposals to government agencies, manuals that explain how to operate, assemble, disassemble, maintain, or overhaul components of a missile system or a home appliance, or articles for scientific and engineering periodicals or popular magazines.

Places of Employment

An estimated 20,000 technical writers and editors—about one-fifth women—were employed in 1974. Many technical writers are employed in the electronic and aerospace industries. Some work for research and development firms or for the Federal Government—mainly in the Departments of Defense and Agriculture, the Energy Research and Development Administration, and the National Aeronautics and Space Administration. Others work in firms that specialize in technical writing. A few are in business for themselves as freelance technical writers.

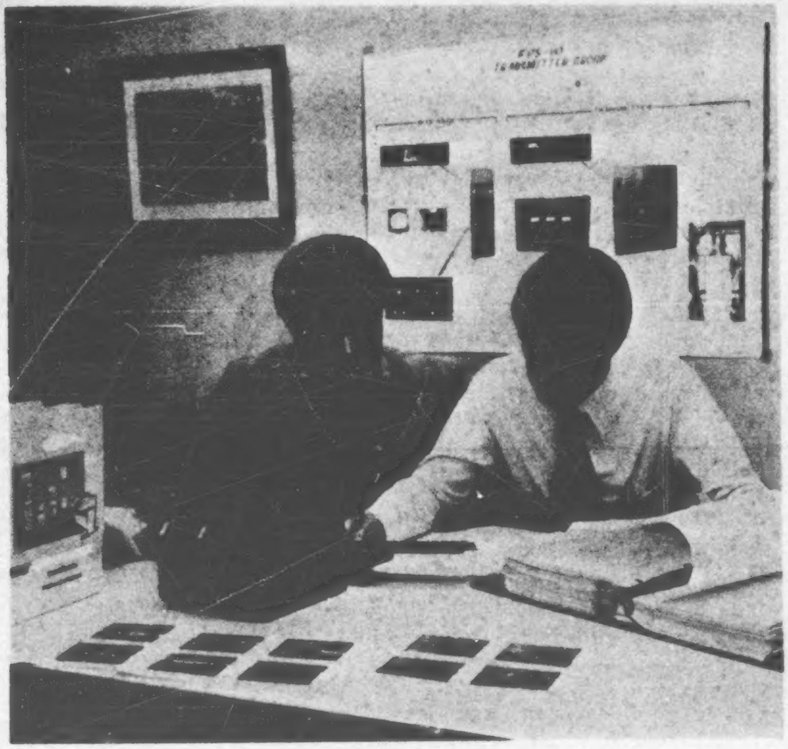
Technical writers are employed all over the country but the largest concentrations are in the Northeastern States, Texas, and California.

Training, Other Qualifications, and Advancement

Although there are no prescribed requirements for entry into the technical writing field, a combination of technical experience and writing ability will generally qualify a person to work as a technical writer.

While a college background is helpful and sometimes necessary, most technical writers do not enter the occupation as recent college graduates. The majority, whatever their level of educational attainment, work initially as technicians, scientists, or engineers. In time, usually as a part of their technical assignment, they assume some writing duties, and develop technical communication skills. Eventually they decide to work entirely in technical writing.

Some employers, however, demand a 4-year college education. Many prefer the applicant to have a



Technical writers discuss specifications of fighter plane component to be included in technical manual.

degree in science or engineering, with a strong background in English, while others emphasize writing ability.

In 1974, 12 colleges and universities offered 4-year programs leading to a bachelor's degree in technical writing, technical communication, or technical journalism; three schools offered graduate work and degrees in the field. More than 400 4-year colleges offered at least one course in technical writing as part of the regular curriculum. Almost all colleges, and some engineering schools, offer English courses to sharpen writing skills, and some conduct summer workshops and short-term seminars for technical writers.

Besides having writing skills, technical writers should be able to think logically, understand scientific and technical concepts, and do detailed and accurate work. They should be able to work and talk easily with others since they often work as part of a team. At other times, however, technical writers must work alone with little or no supervision, so they must be able to accept responsibility and exercise initiative.

Beginners often assist experienced technical writers by doing library research, and by preparing drafts of reports. Experienced writers in organizations that have large technical writing staffs may advance to technical editor or other supervisory and administrative positions. After gaining experience and contacts, a few go into business for themselves. It also is possible to advance by becoming a specialist in a particular scientific or technical subject. These writers sometimes prepare syndicated newspaper columns or articles for popular magazines.

Employment Outlook

Employment of technical writers is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to openings due to growth, opportunities will result from the need to replace those who die, retire, or transfer to other occupations. Employment opportunities will be best for experienced technical writers and for beginners who have good writing ability and the appropriate technical education. Those with only minimum qualifications, however, may face stiff competition for beginning jobs.

Requirements for technical writers are expected to increase because of the need to put the growing amount of scientific and technical information into language that can be understood by managers for decisionmaking and by technicians for operating and maintaining complex industrial equipment. Since many products will continue to be assembled from components manufactured by different companies, technical writers also will be needed to describe, in simple terms, how the components fit together. Others will be needed to improve and simplify operating and maintenance instructions for consumer products.

However, since many technical writers work in defense- and space-related activities, including research and development, future job opportunities are related to government expenditures in these areas. Through the mid-1980's, R & D expenditures of Government and industry are expected to increase, although at a slower rate than during the 1960's.

Technical writers, as discussed in this statement, include only those persons whose primary job is to write about, interpret and edit technical subject matter. Those primarily employed as scientists, engineers or other technical specialists who may do a considerable amount of writing are not covered here. As technology becomes increasingly complex, more writing assignments may require technical and scientific knowledge equivalent to that of an engineer or scientist.

Technical writers who have training in journalism may find opportunities in other fields that employ writers such as advertising, public relations, trade publishing, and television and radio broadcasting.

Earnings and Working Conditions

Technical writers have high earnings compared with average earnings for nonsupervisory workers in private industry, except farming. Salaries of technical writers depend not only on ability, education, and experience, but also on the type, size, and location of their employing firm.

Starting salaries in 1974 ranged from about $7,000 a year for those with minimal qualifications to over $15,000 a year for those with technical experience and college education. Experienced technical writers average around $17,500 a year, while those in supervisory positions earned $20,000 or more.

Earnings of freelance writers vary greatly and depend on the writer's ability and reputation.

In the Federal Government in late 1974, inexperienced technical writers with a bachelor's degree and about five science courses could start at either $8,500 or $10,520 a year, depending on their college grades. Those with 2 years of experience could start at $12,841 and with 3 years of experience, $15,481.

Technical writers generally work in clean well-lighted places, though they may work under considerable pressure, frequently working overtime when a publication deadline has to be met.

Sources of Additional Information

For information about careers in technical writing, contact:

Society for Technical Communication, Inc.,
Suite 421, 1010 Vermont Ave. NW.,
Washington D.C. 20005.

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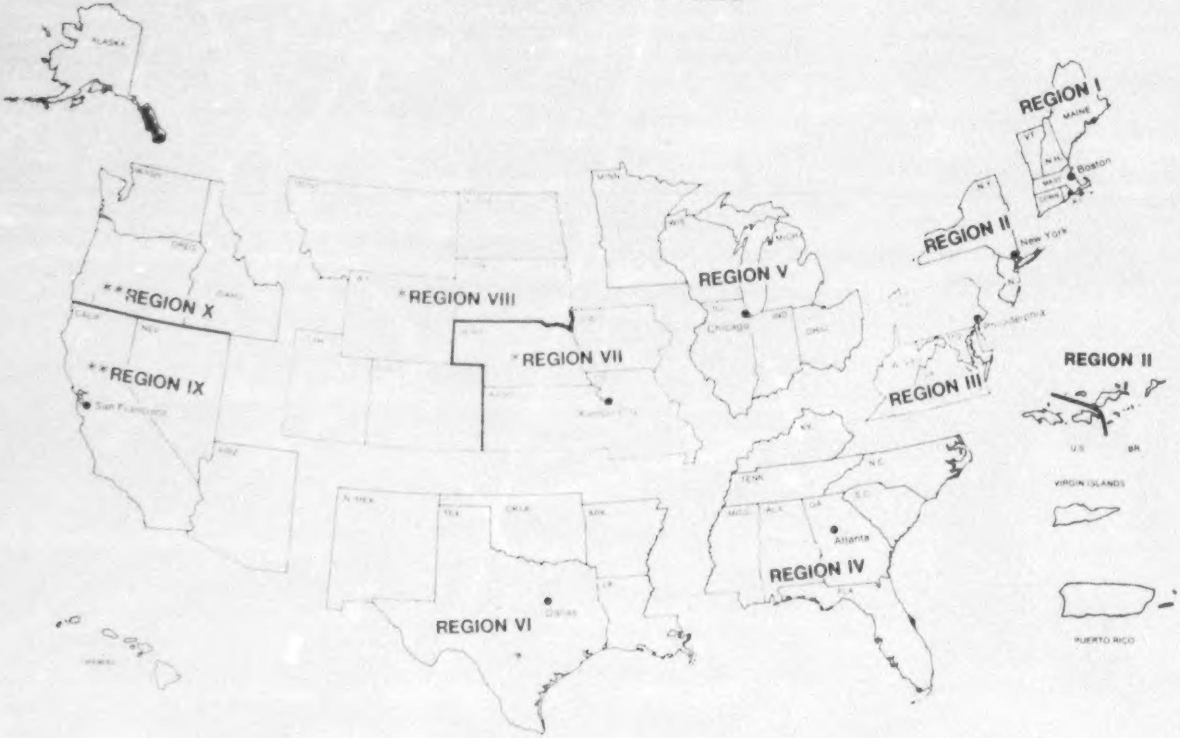
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Region I
1603 JFK Federal Building
Government Center
Boston, Mass. 02203
Phone: (617) 223-6761

Region II
Suite 3400
1515 Broadway
New York, N.Y. 10036
Phone: (212) 399-5405

Region III
3535 Market Street
P.O. Box 13309
Philadelphia, Pa. 19101
Phone: (215) 596-1154

Region IV
1371 Peachtree Street, NE.
Atlanta, Ga. 30309
Phone: (404) 526-5418

Region V
9th Floor
Federal Office Building
230 S. Dearborn Street
Chicago, Ill. 60604
Phone: (312) 353-1880

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